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EPA Superfund
Record of Decision:

NATIONAL STARCH & CHEMICAL CORP.
EPA ID: NCD991278953
OU 03
SALISBURY, NC
10/07/1993

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July 1994

EPA Superfund Record of Decision:

National Starch and Chemical Company Site, Salisbury, NC

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION
OPERABLE UNIT #3

NATIONAL STARCH & CHEMICAL COMPANY SITE
SALISBURY, ROWAN COUNTY
NORTH CAROLINA

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

OCTOBER 1993

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Chemical Starch & Chemical Company
Cedar Springs Road, Salisbury, Rowan County, North Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Operable Unit Three Remedial Action for the National Starch & Chemical Company Superfund Site in Salisbury, North Carolina, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan. This decision is based on the Administrative Record file for this Site.

The State of North Carolina conditionally concurs with the selected remedy for Operable Unit Three. State comments on this Record of Decision, as well as EPA's responses to those comments, can be found in Appendix A of this document.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment. Presently, no unacceptable current risks were identified associated with the National Starch & Chemical Company Site. The principle threat pertains to the future and potential use of the groundwater beneath and downgradient of the Site and the potential adverse impact contaminated soils will have on the quality of the groundwater.

DESCRIPTION OF THE SELECTED REMEDY

This Operable Unit is the third of four Operable Units for this Site. The first two Operable Units addressed the contamination associated with the Trench Area. This Operable Unit and the fourth Operable Unit will address the contamination associated with the active production area of the National Starch & Chemical Company facility and the wastewater treatment lagoon area.

This Operable Unit, Operable Unit #3, will permanently remove contaminants in the groundwater through groundwater extraction and on-site, above-ground treatment with the discharge of the treated groundwater to be combined with the facility's effluent to the City of Salisbury publicly owned treatment works. Operable Unit #4 will address the contaminated soils in this portion of the Site.

The major components of Operable Unit #3 Remedial Action include:

- Design and implementation of the specified groundwater remediationsystem. The groundwater remediation alternative includes extraction wells to remove contaminated groundwater, an air stripper to remove the volatile organic contaminants from the extracted groundwater, control of emissions from the air stripper to the atmosphere through vapor-phase carbon adsorption filters, and discharging treated groundwater to the City of Salisbury publicly owned treatment works system.

- Long-term monitoring of the groundwater and surface water and sediment in the Northeast

Tributary.

- Implementation of a deed restriction on the property as an institutional control.

- Review and evaluate the existing groundwater monitoring system to insure proper monitoring of both groundwater quality and groundwater flow so that the effectiveness of the groundwater extraction system can be evaluated. Additional monitoring wells and/or piezometers will be added to mitigate any deficiencies.

- Performance of five (5) year reviews in accordance to Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

ADDITIONAL SAMPLING AND MONITORING

Additional monitoring wells shall be installed during the Remedial Design to further delineate the vertical extent of groundwater contamination in the bedrock. Additional aquifer tests may also be needed in order to properly design the selected remedy. And in order to establish a broader database on groundwater quality and groundwater levels, samples and groundwater level readings will be collected and analyzed on a regular basis prior to implementation of the Remedial Action.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Since this remedy may result in hazardous substances remaining in the groundwater on-site above the chemical-specific applicable requirements, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

October 7, 1993
Patrick M. Tobin Date
Acting Regional Administrator

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APPENDICES

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LIST OF ACRONYMS

AOC	-	Administrative Order on Consent
ARAR	-	Applicable or Relevant and Appropriate Federal, State or Local Requirements
AWQC	-	Ambient Water Quality Criteria
CAA	-	Clean Air Act
CERCLA	-	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund)
cm/sec	-	centimeters per second
CD	-	Consent Decree
CRP	-	Community Relations Plan
CSF	-	Cancer Slope Factor
CWA	-	Clean Water Act
1,2-DCA	-	1,2-Dichloroethane
ESD	-	Explanation of Significant Difference
EPA	-	Environmental Protection Agency
FS	-	Feasibility Study
GAC	-	Granular Activated Carbon
gpm	-	gallons per minute
HI	-	Hazard Index
HQ	-	Hazard Quotient
HRS	-	Hazardous Ranking System
LRDs	-	Land Disposal Restrictions
MCLs	-	Maximum Contaminant Levels
MCLGs	-	Maximum Contaminant Level Goals
mg/kg	-	milligrams per kilogram
mph	-	miles per hour
MW	-	Monitoring Well
NCAC	-	North Carolina Administrative Code
NCDEHNR	-	North Carolina Department of Environment, Health, and Natural Resources
NCGS	-	North Carolina General Statute
NCP	-	National Oil and Hazardous Substances Pollution Contingency Plan
ND	-	Not Detected
NOAA	-	National Oceanic and Atmospheric Administration
NPDES	-	National Pollution Discharge Elimination System
NPL	-	National Priority List
NSC	-	National Starch & Chemical Company
NSCC	-	National Starch & Chemical Company
O&M	-	Operation and Maintenance
OU	-	Operable Unit
POTW	-	Publicly Owned Treatment Works
ppb	-	parts per billion
ppm	-	parts per million
PQL	-	Practical Quantitative Limit
PRP	-	Potentially Responsible Party
PW	-	Present Worth
RA	-	Remedial Action
RCRA	-	Resource Conservation and Recovery Act
RfD	-	Reference Dose
RD	-	Remedial Design
MI	-	Remedial Investigation
RME	-	Reasonable Maximum Exposure
ROD	-	Record of Decision
SARA	-	Superfund Amendments and Reauthorization Act of 1986

SDWA	-	Safe Drinking Water Act
SVOCs	-	Semi-volatile Organic Compounds
TAL	-	Target Analyte List
TBC	-	To Be Considered
TCL	-	Target Compound List
TCLP	-	Toxicity Characteristic Leaching Procedure
TMV	-	Toxicity, Mobility, or Volume
g/kg	-	micrograms per kilogram
g/l	-	micrograms per liter
VOCs	-	Volatile Organic Compounds

RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION OPERABLE UNIT THREE
NATIONAL STARCH & CHEMICAL COMPANY SUPERFUND SITE
SALISBURY, ROWAN COUNTY, NORTH CAROLINA

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The National Starch & Chemical Company (NSCC Site or the "Site") Site is located on Cedar Springs Road in Salisbury, Rowan County, North Carolina. The Site is approximately 5 miles south of the City of Salisbury at latitude 35 37'49" north and longitude 80 32'03" west. Figure 1 shows the location of the Site with respect to the City of Salisbury. The areas of the Site that compose Operable Unit (OU) #3 are shown in Figure 2. OU #3 includes the following areas of the NSCC facility: Area 2, the parking lot, the Northeast Tributary, and the wastewater treatment lagoons. Area 2 consists of the following operations: Area 2 Reactor Room, the Tank Room, Raw Material Bulk Storage, and the Warehouse. The lagoon area includes three lagoons which were constructed between 1969-1970 as unlined lagoons. Wastewater was pumped into Lagoon 2 from 1970 to 1978. In 1978, Lagoon 1 was put into service and Lagoon 3 was lined with concrete. Lagoons 1 and 2 were originally used as settling and evaporation lagoons. In 1984, Lagoons 1 and 2 were excavated and also lined with concrete. Contaminated soil excavated from beneath the lagoons was removed and disposed of in an area west of the plant area. The saturated soil was landfarmed and then used as fill material for expanding the facility's parking lot. A fourth lagoon was installed in 1992 as part of the treatment system to treat the contaminated groundwater generated by the OU #1 Remedial Action (RA). In the remainder of this Record of Decision (ROD), the term "Site" refers to the areas investigated as part of OU #3 (i.e., Area 2, the lagoon area, and the Northeast Tributary) unless otherwise specified.

Land use of the areas immediately adjacent to the NSCC property is a mixture of residential and industrial developments. An industrial park is located on the east and south sides of the Site. Another industrial park is located along the southern property line. A mobile home park adjoins the extreme southwestern corner of the NSCC property. Two housing developments lay to the north, one of which is adjacent to the facility property. The location of the nearest private, potable wells is approximately 2,700 feet north of Area #2.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In September 1968, Proctor Chemical Company purchased the 465-acre tract of land on Cedar Springs Road. Within the next year, Proctor Chemical was acquired by NSCC which operated the facility as a separate subsidiary. Construction of the plant on Cedar Springs Road began in 1970. On January 1, 1983, Proctor Chemical Company was dissolved and its operations merged with NSCC.

The primary products of this facility are textile-finishing chemicals and custom specialty chemicals. Volatile and semi-volatile organic chemicals are used in the production process along with acidic and alkaline solutions. Acidic and alkaline solutions are also used in the cleaning processes. The liquid waste stream from the manufacturing processes include reactor and feed line wash and rinse solutions. This wastewater may include a combination of the following chemicals: acrylimide, 1,2-dichloroethane (1,2-DCA), methyl isobutyl ketone, methanol, styrene, maleic anhydride, vinyl toluene, sulphonated polystyrene, epichlorohydrin, octyl alcohol, ethyl alcohol, allyl alcohol, allyl chloride, sodium hydroxide, and sulfuric acid.

<Figure>
FIGURE 1 LOCATION OF THE NATIONAL STARCH & CHEMICAL COMPANY SUPERFUND SITE

<Figure>
FIGURE 2 LOCATION OF FEATURES ASSOCIATED WITH OPERABLE UNIT #3

As the result of finding contaminants in groundwater and in the surface water/sediment of the Northeast Tributary, the original scope of work specified in the initial 1987 Remedial Investigation/Feasibility Study (RI/FS) Work Plan was expanded. The first RI/FS resulted in OU #1 ROD which was issued by the Environmental Protection Agency (EPA or Agency) on September 30, 1988. The OU #1 ROD divided the Site into two Operable Units. The ROD for OU #1 required the installation of a groundwater interception, extraction, and treatment system in the western portion of the facility. The contaminants in the groundwater in this area are emanating from the trench area. OU #2 further investigated the contaminated soils in the trench area along with additional monitoring of the surrounding tributaries. OU #2 ROD was signed on September 28, 1990 and required additional work to identify, characterize, and delineate the contamination being continuously detected in the Northeast Tributary. This investigation has resulted in the development of OU #3 and OU #4.

The NSCC Superfund Site was proposed for inclusion on the National Priorities List (NPL) in April 1985, re-proposed in June 1988, and finalized on the list in October 1989 with a Hazardous Ranking System (HRS) score of 46 51. The HRS score was based on the following exposure route scores: exposure via groundwater pathway - 80.46, exposure via surface water pathway - 0.00, and exposure via air pathway - 0.00. Currently, the Site is cataloged as Number 257 of the 1,249 Superfund sites across the country on the NPL.

National Starch & Chemical Company, the Potentially Responsible Party (PRP),has performed OU #1, OU #2, and OU #3 under the direction and requirements specified in the Administrative Order on Consent (AOC) signed by the Agency and PRP in December 1986. Since there has only been one owner/operator of this property after being developed into an industrial complex, no "Responsible Party Search" was performed. National Chemical Starch & Chemical Company has been and remains the owner/operator of the facility.

A special notice letter was sent on May 30, 1986 to provide NSCC an opportunity to conduct the first RI/FS. A good faith offer was submitted and negotiations were concluded with NSCC signing an AOC on December 1, 1986. The first RI/FS was completed on June 21, 1988 and September 8, 1998, respectively. The ROD signed on September 30, 1988, divided the Site into two operable units. OU #1 consists of contaminated groundwater and OU #2 consists of trench area soils and surface water/sediment in surrounding tributaries.

Following the signing of OU #1 ROD, the Agency sent a special notice letter to the PRP to initiate negotiations on a Consent Decree (CD) for implementing the OU #1 Remedial Design/Remedial Action (RD/RA). However, negotiations on the CD were not successful resulting in the Agency issuing an Unilateral Administrative Order (UAO) directing NSCC to design and implement the RA specified in the OU #1 ROD. The effective date of the UAO was July 27, 1989.

In support of OU #2, NSCC generated Supplemental RI and FS Reports. These reports were prepared in accordance to the December 1, 1986 AOC. These reports were completed in May 1990 and September 1990, respectively. The Supplemental RI reported continued detections of contaminants in the Northeast Tributary but did not identify the source of this contamination.

Consequently, the OU #2 ROD divided the Site into a third operable unit. Following the signing of the OU #2 ROD, the Agency sent the PRP another special notice letter in March 1991 to initiate negotiations on a second CD. This CD governed the implementation of the RA required by OU #2 ROD. The CD was signed in August 1991 and was entered by the Federal Court on July 20, 1992.

On December 4, 1991, EPA issued written notification to NSCC to conduct a third RI/FS to determine the source, nature, and extent of contamination entering the Northeast Tributary as required by OU #2 ROD. As with the previous RI/FS efforts, OU #3 RI/FS was conducted in accordance to the December 1, 1986 AOC. The OU #3 RI and FS reports were completed on June 2, 1993 and June 21, 1993, respectively. NSCC will be provided an opportunity to conduct the OU #3 RD/RA as specified in this ROD through the issuance of a third RD/RA special notice letter.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

In 1986, community relations activities for this Site were initiated in conjunction with the development of the RI/FS Work Plan. In developing the August 1986 Community Relations Plan, the issues and concerns expressed by local citizens from the Site area were compiled and an overview of these issues and concerns was prepared. A copy of the Community Relations Plan was placed in the Information Repository located at the Rowan County Public Library in Salisbury. A mailing list was developed based upon people interviewed, citizens living around the Site, and people attending Site related public meetings. The mailing list also includes local, State, and Federal public servants and elected officials.

Several fact sheets and public meetings were held with respect to OU #1 and OU#2. The following community relations activities were conducted by the Agency with respect to OU #3.

Two fact sheets and the Proposed Plan Fact Sheet were distributed to the public during the OU #3 RI/FS. The first fact sheet, disseminated in June 1991, provided the community a status report of activities associated with all three (3) Operable Units. This Fact Sheet provided a brief history of the Site, a summary of current activities at the Site, a brief overview of the Superfund program, and a list of contacts for more information. A second Fact Sheet was distributed in June 1993. This fact sheet summarized the findings and conclusions of the OU #3 RI Report which included the Baseline Risk Assessment, and provided a revised time frame for future activities at the Site. A flyer was also distributed in June 1993 informing the public of a change in the Agency's personnel associated with the management of the Site.

The public was informed through the Proposed Plan Fact Sheet and an ad published on July 19, 1993 in The Salisbury Post and The Charlotte Observer newspapers of the August 3, 1993 Proposed Plan Public Meeting. The Proposed Plan Fact Sheet was mailed to the public on July 15, 1993. The basis of the information presented in the Proposed Plan was the June 21, 1993 FS document. A press release reminding the public of the upcoming public meeting was also issued on July 30, 1993. The Proposed Plan also informed the public that the public comment period would run from July 19, 1993 to August 17, 1993.

The goals of the Proposed Plan meeting were to review the remedial alternatives developed, identify the Agency's preferred alternative, present the Agency's rationale for the selection of this alternative, encourage the public to voice its own opinion with respect to the remedial alternatives reviewed and the remedial alternative selected by the Agency, and inform the public that the public comment period on the Proposed Plan would conclude on August 17, 1993. The public was also informed a 30 day extension to the public comment period could be requested and that all comments received during the public comment period would be addressed in the Responsiveness Summary.

On Wednesday, August 11, 1993, the Agency received a request for a 30-day extension to the public comment period which extended the public comment period to midnight September 16, 1993. A notice was mailed on August 18, 1993 to the addressees on the mailing list informing them of this extension. An ad was also published in the August 24, 1993 edition of The Salisbury Post and The Charlotte Observer newspapers informing the public that the public comment period had been extended to September 16, 1993.

Pursuant to Section 113(k)(2)(B)(i-v) and 117 of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), all documents associated with the development of the Proposed Plan and the selection of the remedial alternative specified in this ROD were made available to the public in the Administrative Record located both in the Information Repository maintained at the EPA Docket Room in Region IV's office and at the Rowan County Public Library in Salisbury, North Carolina.

4.0 SCOPE AND ROLE OF OPERABLE UNIT WITHIN SITE STRATEGY

As with many Superfund sites, the problems at the NSCC Site are complex. As a result, EPA organized the work into four operable units. These are:

OU #1 Groundwater in western portion of the NSCC property

OU #2 Trench Area soils and surface water/sediments in the Northeast Tributary

OU #3 Groundwater under Area 2, the parking lot, and the wastewater treatment lagoons and the surface water/sediments in the Northeast Tributary

OU #4 Contaminated soils in and around Area 2 and the wastewater treatment lagoons.

This ROD has been prepared to summarize the remedial selection process and to present the selected remedial alternative. OU #4 will focus on the contaminated soils in Area 2 and around the treatment lagoons.

EPA has already selected remedies for OU #1 in a ROD signed September 30, 1988, and OU #2 in a ROD signed September 30, 1990 (the contaminated groundwater and contaminated soils associated with the Trench Area, respectively). Construction on the OU #1 remedial action phase began in August 1990. OU #2 was initiated on July 20, 1992, the filing date for the CD. OU #2 ROD specified no action for the soils in the Trench Area, long-term monitoring of the soils in the Trench Area, and an investigation to determine the source of contamination being detected in the Northeast Tributary.

The third OU, the subject of this ROD, addresses the contaminated groundwater emanating from Area 2 and treatment lagoon area. The potential use of this contaminated groundwater as potable water results in an unacceptable future risk to human health as EPA's acceptable risk range is exceeded and concentrations are greater than maximum contaminant levels (MCLs) as established by the Safe Drinking Water Act. The purpose of this response is to prevent current or future exposure to the contaminated groundwater. OU #3 is the third of four operable units contemplated for this Site.

5.0 SUMMARY OF SITE CHARACTERISTICS

The NSCC OU #3 RI/FS is complete. The June 2, 1993 RI Report, conditionally approved by the Agency on July 7, 1993, identified the source, characterized the nature, and defined the probable extent of the uncontrolled hazardous wastes in the soil, groundwater, and surface water/sediment in the area addressed by this Operable Unit with the acceptance of the vertical extent of contamination in the bedrock zone of the aquifer. The OU #3 RI Report included a Baseline Risk Assessment. The Baseline Risk Assessment defined the risk posed by the hazardous contaminants present in the area investigated as part of OU #3. The Proposed Plan Fact Sheet, based on the June 21, 1993 OU #3 FS document, provided the public a summary of the detailed analysis of the five (5) alternatives for groundwater remediation and the two (2) remedial alternatives for addressing the contamination detected in the surface water/sediment of the Northeast Tributary.

The overall nature and extent of contamination associated with OU #3 is based upon analytical results of environmental samples collected from surface and subsurface soils, the groundwater, surface water and sediment of the Northeast Tributary, and the chemical/physical and geological/hydrogeological characteristics of the area. Environmental samples were collected over a period of time and activities. The majority of the samples collected during the OU #3 RI were screened for volatile organic compounds (VOCs) as the previous Remedial Investigations conducted at the NSCC facility identified VOCs as the primary contaminants at the Site. A review of the historical use of chemicals in the manufacturing processes at the Site also supports this appraisal. The remainder of the samples were analyzed for the entire target compound list (TCL) and target analyte list (TAL) constituents. The TCL includes VOCs, semi-volatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs); the TAL includes inorganics such as metals and cyanide.

VOCs, SVOCs, one pesticide, and numerous inorganic analytes were detected in the soils and groundwater and two VOCs and a number of metals were detected in the surface water/sediment samples.

Background/control samples were collected for groundwater and surface water and sediment. No background surface or subsurface soils samples were collected for OU #3. Therefore, any organic contaminant detected in the soils that could not be attributed to cross contamination, was presumed to be a Site related contaminant. The inorganic analytical data generated for the upgradient sediment sample (SE-12), collected from the Northeast Tributary, was used for comparison for surface and subsurface soils.

Table 1 lists the contaminants detected in each environmental medium sampled as well as the frequency and range of concentrations detected. As can be seen, no PCBs were detected in any of the environmental samples collected. The pesticide detected at the Site was delta-hexachlorocyclohexane (delta-BHC). It was detected once in the soil and once in the groundwater at very low concentrations. Pesticides have never been manufactured at this facility. Cyanide was detected twice in the soil and twice in the groundwater at very low concentrations. The concentrations of both delta-BHC and cyanide are below health base clean up goals. Based on the above information, the following contaminants or group of contaminants will not be discussed in the following sections: PCBs, pesticides,and cyanide. The following sections discuss the results and interpretations of the data collected and generated for each environmental medium investigated as part of OU #3 RI.

Air samples were not collected as part of the OU #3 RI/FS effort. However, the air was monitored during the RI field work as part of the health and safety effort. Based of the information collected, the quality of the air at and around the Site is not currently being adversely impacted by the Site. The PRP also runs routine air sampling in the active portions of the facility as part of their internal, corporate health and safety procedures.

The estimated volume of groundwater impacted is approximately 131 million gallons.

5.1 SOILS

A total of 107 soil samples were collected to identify the source, characterize the contaminants present, and delineate the extent of soil contamination. The soil samples were collected from 59 different locations. These soil samples included 11 surface soil samples (0 to 2 feet below the surface) with the rest being collected between 2 feet below surface to either the water table interface or auger refusal.

VOCs, SVOCs, one pesticide, and inorganics were detected in the soils. To summarize the tabulated analytical results for all the soils samples, a total of 14 different VOCs, one (1)

SVOC, one (1) pesticide, 14 metals, and cyanide were detected. As can be seen in Table 1, the VOCs most frequently detected and observed in the highest concentrations were acetone, 2-butanone, chloroform, dibromochloromethane, 1,2-DCA, and toluene (listed alphabetically). A variety of metals were also detected in the soils. Although these metals occur naturally in soil, elevated concentrations of 7 metals were detected. The following metals were either detected in onsite soils but not in the background soil sample (SE-12) or detected onsite at concentrations at least two times greater than the background concentration: barium, chromium, cobalt, copper, manganese, nickel, and vanadium.

In general, the greatest concentrations of organic contaminants were found in two (2) areas. In the soils underneath Area 2 and north-northeast of the lagoon area. The majority of the elevated levels of metals were detected in Area 2. Based on the information generated and collected as part of the OU #3 RI, the following sources of contamination have been identified. In Area 2, the source of contamination has predominantly been the underground terra-cotta piping which was used to transported wastewater from the production area to the lagoons as well as control and direct surface water run-off from the plant area to the embankments of the Northeast Tributary. Currently, NSCC is replacing these buried lines with overhead, stainless steel pipes. NSCC has also controlled surface water runoff from Area 2 through the use of berms and sumps. The berms and the grade of the paved surfaces direct the surface runoff into the sumps. The surface water runoff collected in the sumps is then pumped through above ground pipes to the treatment lagoons. As the underground terra-cotta pipe lines are abandoned, the ends of each section are pressure grouted to ensure that these pipe lines will no longer act as conduits. NSCC projects that the installation of the overhead piping arrangement and abandonment/grouting of the underground terra-cotta pipes will be completed in December 1993.

<Figure>
<Figure>

In the lagoon area, the source of contamination was eliminated in 1984 when the PRP lined its lagoons with concrete. The contamination being detected currently in the soils and groundwater in this area is the result of past practices and the residual contamination in the soil.

A more detailed discussion of the contaminants detected in the soils will be incorporated into the OU #4 ROD.

5.2 GROUNDWATER

The saprolite and bedrock zones of the aquifer have also been adversely impacted by activities at the Site. Contaminants detected in the groundwater include VOCs, SVOCs, one pesticide, metals, and cyanide. The pesticide, delta-BHC, was detected in one saprolite groundwater sample (NS-42) at 0.16 micrograms per liter (g/l). Cyanide was detected twice at concentrations of 16 g/l and 12 g/l at locations NS-13 (a saprolite well) and NS-42, respectively. Table 1 provides a complete list of contaminants detected in the groundwater along with the frequency of detections and the range of concentrations detected. The greatest concentrations of organic contaminants in the groundwater were found underneath and north of Area 2 and north of the lagoon area. In Area 2, contamination can be found throughout the entire aquifer. In the lagoon area, the highest concentrations detected were in the bedrock zone of the aquifer.

A total of 61 groundwater samples were collected from 52 different locations. All of the groundwater samples were analyzed for VOCs. Only groundwater samples collected from permanent monitoring wells were analyzed for the full analytical analyses. To summarize the analytical results, a total of 16 different VOCs, three (3) SVOCs, one (1) pesticide, 14 metals, and cyanide were detected in the groundwater. VOCs detected in concentrations that exceed either Federal MCLs or State groundwater quality standards include (listed alphabetically) acetone, bis(2-chloroethyl)ether, bromodichloromethane, 2-butanone, chloroform, 1,2-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethene (cis- and trans-), 1,2-dichloropropane, ethylbenzene, methylene chloride, tetrachloroethene, toluene, total xylenes, 1,1,2-trichloroethane, trichloroethene, and vinyl chloride. The three SVOCs detected in the groundwater belong to family of organic compounds called phthalates. Numerous metals were also detected in the groundwater. The inorganics that were detected at concentrations exceeding two times the concentration found in the background groundwater samples included: arsenic, barium, beryllium, chromium, cobalt, copper, cyanide, lead, manganese, nickel, vanadium, and zinc.

Groundwater samples from the water table were collected through a variety of methods. Thirteen (13) samples were collected through wellpoints, five (5) groundwater samples were collected employing a push-point water sampler, twelve (12) groundwater samples were collected from temporary wells, and nineteen (19) groundwater samples were collected using a screen water sampler. In addition to collecting groundwater samples from the water table, groundwater samples were collected from the six (6) saprolite and six (6) bedrock monitoring wells that were also installed as part of this investigation. The depth of the saprolite wells ranged between 13 to 80 feet. The depth of the bedrock wells ranged in depth of 39 to 135 feet. The depth to the water table ranged from ground surface at the Northeast Tributary to approximately 33 feet below ground surface.

The RI did not generate sufficient data to completely define the vertical extent of groundwater contamination. It is estimated that the bedrock is fractured to approximately 200 feet below surface. The deepest bedrock well (NS-41) installed to date in this area of the facility goes to a depth of 135 feet. The groundwater sample collected from this well showed elevated levels of VOC contamination. Additional information to address this data gap will be collected during the RD.

5.2.1 SAPROLITE GROUNDWATER

Figures 3 and 4 show the distribution of 1,2-DCA at the water table and in the saprolite zone of the aquifer, respectively. The isopleths shown in Figure 3 are based on the data presented in Tables 2 and 3. Figures 5 and 6 show the sampling locations and analytical results for 1,2-DCA for the data presented in Tables 2 and 3, respectively. The isopleths presented in Figure 4 are based on the data displayed in Table 3 and 4. Figure 4 also shows the locations of the permanent saprolite monitoring wells and the corresponding concentrations of 1,2-DCA detected in each well.

Wellpoints, push-point, temporary wells, and screen water samplers were used to collect groundwater samples at the water table interface. Table 2 lists the frequency of detection and the concentrations of VOCs detected at each wellpoint. Table 3 provides the frequency of detection and the concentrations of VOCs found in the groundwater samples collected by means of the push-point, temporary wells, and screen water samplers. Table 4 provides the most stringent promulgated groundwater standard, the frequency of detection, and the concentrations of contaminants detected in the permanent wells installed to monitor groundwater quality in the saprolite zone of the aquifer. The highest concentration and the greatest variety of VOCs were found in monitoring well NS-42. VOCs detected in NS-42 include acetone (310 g/l), 2-butanone (240 g/l), 1,2-DCA (82,000 g/l), methylene chloride (160 g/l), and toluene (220 g/l).

As can be seen in Figure 4, there are two plumes of contamination in the groundwater in the saprolite zone. One is emanating from Area 2 and the other one originates in the lagoon area. Both plumes have migrated approximately 400-500 feet from their source in a northerly direction. The concentrations detected in the lagoon area are greater in the groundwater than in the unsaturated soils. This indicates that the contaminants are being flushed out of the unsaturated soils through the natural processes of precipitation and percolation.

Monitoring well NS-37 had the largest variety of inorganics detected and typically the highest concentrations of inorganic constituents as well. The metals detected in NS-37 which were twice the background concentration were barium (737 g/l), beryllium (2.5 g/l), chromium (63.6 g/l), cobalt (66.4 g/l), copper (487 g/l), manganese (1,500 g/l), nickel (39.6 g/l), vanadium (272 g/l) and zinc (220 g/l).

5.2.2 BEDROCK GROUNDWATER

Figure 7 shows the distribution of 1,2-DCA in the bedrock zone of the aquifer. This figure also shows the locations of the permanent bedrock monitoring wells and the corresponding concentrations of 1,2-DCA detected in each well. Table 5 lists the most stringent promulgated groundwater standards, the frequency of detection, and the concentrations of contaminants detected in each bedrock well. The highest total concentration of volatiles and the greatest variety of volatiles were found in monitoring well NS-40. VOCs detected in NS-40 included bis(2-chloroethyl)ether (32 g/l), 1,2-DCA (99,000 g/l), 1,1-dichloroethene (5 g/l), methylene chloride (66 g/l), tetrachloroethene (7 g/l), 1,1,2-trichloroethane (6 g/l), total xylenes (11 g/l), and vinyl chloride (120 g/l).

Monitoring well NS-38 had the largest variety of inorganics detected and typically the highest concentrations as well. The metals detected in NS-38 which were twice the background concentration were barium (635 g/l), chromium (13.3 g/l), cobalt (93.6 g/l), and manganese (12,000 g/l).

5.3 SURFACE WATER AND SEDIMENT

A total of 33 surface water and sediment samples have been collected from the Northeast Tributary. The first samples were collected in March 1987 and the most recent samples were collected in January 1993. All the samples collected were analyzed for VOCs. In addition to being analyzed for VOCs, two of the samples (SW/SE-12 and SW/SE-13) were also analyzed for SVOCs and metals. Sampling location SW/SE-12 is the upgradient/background surface water/sediment sampling location. Each sampling event has shown contamination to be present in the surface water and sediment of this tributary. To date, only two (2) VOCs, acetone and 1,2-DCA, have been detected in this stream. As in the other environmental media samples, metals were also detected but these metals occur naturally. Two metals were detected at concentrations at least two times greater than the background concentration. They are manganese in the surface water and copper in the sediment. It was the continuous detection of 1,2-DCA in this stream that led to the initiation of OU #3. The objective of OU #3 RI was to identify, characterize, and delineate the source of contamination continually being detected in the Northeast tributary.

The highest concentration of contaminants was detected in the reach of the tributary that is just east of the production facility. Table 6 lists each sampling event, the sampling locations, and the analytical results for 1,2-DCA in the water column and sediment. Table 7 lists the analytical results for the samples collected at sampling locations SW/SE-12 and SW/SE-13. Figure 8 shows the surface water sampling locations and Figure 9 shows the sediment sampling locations. These figures also present the analytical results for 1,2-DCA for the last samples collected at these sampling locations. The highest concentration of 1,2-DCA detected in the surface water was 3,200 g/l in May 1992 at sampling location SW-13 and the highest concentration of 1,2-DCA detected in the sediment was 7,400 g/kg in June 1991 at sampling location SE-14. Sampling location SW/SE-13 is just downgradient SW/SE-14.

As can be seen in Figures 8 and 9, no contamination was detected upgradient of the Site (SW-12, SW-12A, and SE-12). The concentration of contamination increases as the stream flows adjacent to and past Area 2, the production area. The concentrations decrease as the stream flows away from Area 2.

<Figure>
FIGURE 3 CONCENTRATIONS AND ESTIMATED EXTENT OF 1,2-DICHLOROETHANE CONTAMINATION IN THE GROUNDWATER AT THE WATER TABLE

<Figure>
FIGURE 4 CONCENTRATIONS AND ESTIMATED EXTENT OF 1,2-DICHLOROETHANE CONTAMINATION IN THE SAPROLITE ZONE OF THE AQUIFER

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FIGURE 5 SAMPLING LOCATIONS FOR GROUNDWATER (WATER TABLE) VIA WELLPOINTS AND CONCENTRATIONS OF 1,2-DICHLOROETHANE DETECTED AT EACH WELLPOINT

<Figure>
FIGURE 6 SAMPLING LOCATIONS FOR GROUNDWATER (SAPROLITE ZONE) VIA PUSH-POINT SAMPLER, TEMPORARY MONITORING WELL, AND SCREENED WATER SAMPLER AND CORRESPONDING CONCENTRATIONS OF 1,2-DICHLOROETHANE DETECTED AT EACH SAMPLING LOCATION

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FIGURE 7 CONCENTRATIONS AND ESTIMATED EXTENT OF 1,2-DICHLOROETHANE CONTAMINATION IN THE BEDROCK ZONE OF THE AQUIFER

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FIGURE 8 SURFACE WATER SAMPLING LOCATIONS ALONG THE NORTHEAST TRIBUTARY AND ASSOCIATED CONCENTRATIONS OF 1,2-DICHLOROETHANE

<Figure>
FIGURE 9 SEDIMENT SAMPLING LOCATIONS ALONG THE NORTHEAST TRIBUTARY AND ASSOCIATED CONCENTRATIONS OF 1,2-DICHLOROETHANE

Surface water and sediment samples were collected on three occasions from the Northeast Tributary just prior to its leaving the NSCC property. The first samples (sampling location NSW2/S2) were collected in June 1987, the second set of samples were collected in July 1990 (sampling location SW/SE-15), and the last time in June 1991 (again, at sampling location SW-SW-15). As can be seen in Table 6, no contaminants were detected downstream of the plant prior to the stream leaving the NSCC property which indicates that under normal weather conditions, no contamination is leaving the Site via the Northeast Tributary.

Surface water and sediment samples were also collected to perform toxicity tests as part of the environmental assessment of this stream. The results of the environmental exposure assessment are discussed in Section 6.6.

The Northeast Tributary is not specifically classified due to the low flow conditions within the stream, however, it is considered as a Class "C" stream under North Carolina Administrative Code, Title 15A, Subchapter 2B (NCAC 15A-2B.02) because the receiving stream of the Northeast Tributary, Grants Creek, is classified as a Class C stream. A Class C stream is defined as being suitable for secondary recreation and the "propagation of natural trout and maintenance of trout". Neither sport nor commercial fish species were observed in the surface waters during the RI field work.

5.4 HYDROGEOLOGICAL SETTING

The groundwater beneath the NSCC property is designated as Class GA in accordance with North Carolina's water classification system and Class IIA under USEPA Groundwater Classification Guidelines (December 1986). The Class GA classifications means that the groundwater is an existing or potential source of drinking water supply for humans as specified under North Carolina Administrative Code, Title 15, Subchapter 2L (NCAC 15-2L.02). EPA classifies the groundwater as Class IIA since the aquifer is currently being used as a source of drinking water in the vicinity of the NSCC facility. Therefore, the groundwater needs to be remediated to a level protective of public health and the environment as specified in Federal and State regulations governing the quality and use of drinking water.

At the NSCC site, a thick mantle of residual soil extends from the ground surface to the bedrock. This mantle, the saprolite, is composed of clay-rich residual soils which range from silty to sandy clays. The saprolite is derived from the intense chemical weathering of the crystalline bedrock and has retained the structural fabric of the parent materials below the oxidation profile. These residual soils exhibit increasing amounts of sand-sized relict mineral grains below the oxidation horizon and closer to the bedrock. There appears to be a complete gradation from saprolite/friable weathered bedrock, to fractured bedrock/sparsely fractured bedrock. The depth to bedrock ranges from 10 to 100 feet below ground surface. The deepest bedrock was encountered was in the vicinity of the Northeast Tributary. Figure 10 shows the orientation of the hydrogeological cross-section of the Site which is displayed in Figure 11.

Soil fissures near the water table are filled with geothite, presumably derived from the weathering of the iron-bearing minerals present in the parent rock. There appears to be no confining layer between the saprolite and bedrock. Therefore these two lithologic units are hydraulically interconnected, and there is little or no impedance between these two zones.

The lithology of the soils underlying the Site was determined from drilling logs. The thickness of the soil mantle varies across the Site. It appears that Area 2 occupies a structural high and that the bedrock surface slopes steeply away from this area to the east and more gently to the north. Rock core records show that the upper 10 to 15 feet of bedrock is deeply weathered and friable. Bedrock begins to appear nonfriable and fresh 15 to 25 feet below the bedrock/saprolite interface. However, fractures continue to be frequent and fracture surfaces often exhibit oxidation staining to depths of 40 to 100 feet below the bedrock/saprolite interface. Fracture frequency diminishes downward from the bedrock/saprolite interface. It has been estimated that the bedrock becomes competent approximately 200 feet below ground surface.

Water level measurements from the water table/saprolite zone of the aquifer indicate that hydraulic heads decrease from both the east and west towards the Northeast Tributary and towards the north along the stream. This data indicates that the Northeast Tributary acts as a groundwater divide for the saprolite zone of the aquifer and receives groundwater discharge along its entire reach. This explains the presence of contaminants being detected in the surface water and sediment of this tributary. Additional data needs to be collected during the RD to determine where groundwater in the bedrock zone of the aquifer is discharging.

The hydraulic conductivity of the saprolite materials and the bedrock ranges from 0.72 to 3.35 feet per day (ft/day) and 0.01 to 1.13 ft/day, respectively. Based of the above information, the horizontal flow of groundwater in the saprolite was estimated to have a velocity of 80 feet/year (ft/yr) in the lagoon area and 27 ft/yr in Area 2. Additional information will be collected during the RD to better define the horizontal flow velocity in the bedrock zone of the aquifer.

5.5 PATHWAYS AND ROUTES OF EXPOSURE

The chemicals of concern for groundwater are listed in the Table 8. This list includes VOCs, a SVOC, and metals. Contaminants were included in Table 8 if the results of the risk assessment indicated that the contaminant might pose a significant current or future risk or contribute to a risk which is significant. The criteria for including contaminants in this table was a carcinogenic risk level within or above the acceptable range (i.e., 1E-4 to 1 E-6) or a hazard quotient greater than 0.1. Contaminants were also included if they exceeded either State or Federal applicable or relevant and appropriate requirements. 1,2-DCA is the only the chemical of concern detected in the surface water.

An exposure pathway is the route or mechanism by which a chemical agent goes from a source to an individual or population (i.e., the receptor). Each exposure pathway must include the following:

- A source or mechanism of chemical release to the environment
- A transport medium (e.g., soil, groundwater, air, etc.)
- An exposure point (where a receptor will contact the medium)
- An exposure route (i.e., ingestion, inhalation, or dermal contact).

A pathway is considered complete when all of the above elements are present.

Based on the information collected during the RI, the four transport mechanisms occurring at the NSCC site are:

- where soils exhibit high levels of contaminant, infiltration of recharge will form leachate, which will transport the dissolved contaminants downward to the water table
- once contaminants have reached the water table, the dissolved contaminants will be transported with groundwater
- where contaminated groundwater discharges to a surface water body, the contaminants will mix with the surface water and be transported downstream
- where contaminants in the water exhibit an affinity for partitioning to organic carbon, some contaminants may become adsorbed to the surface sediment in the receiving stream and may be transported with stream bedload during flooding.

The air pathway was qualitatively evaluated but not quantitatively evaluated as an exposure pathway for volatilized chemicals and particulate emissions from surface soils for the following reasons:

1)M

2)F

3) contaminant detected in the surface soil are listed below: E

Contaminant	microgram per kilogram (g/kg)
acetone	3,500
2-butanone	25
chloroform	2
1,2-DCA	15
toluene	4

Potential current and future human exposure pathways are summarized in Table 9. This table presents potential routes of exposure, potential receptors, an evaluation of pathway completeness, and an assessment of exposure potential. As can be seen, there are no current complete exposure pathways that pose an unacceptable risk to human health or the environment. Since use of the land surrounding the NSCC facility is a mixture of residential and commercial, it is possible that the Site may be used as either residential or commercial area in the future, therefore, both scenarios were evaluated and incorporated into Table 9.

In summary, the following pathways were evaluated in the risk assessment:

- Potential current exposure under current land use conditions outside plant operations area to contaminants in surface water and sediment and springs through incidental ingestion and dermal contact, and inhalation.

<Figure>
FIGURE 10 ORIENTATION AND LOCATION OF HYDROGEOLOGIC CROSS SECTION SHOWN IN FIGURE 7

<Figure>
FIGURE 11 HYDROGEOLOGIC CROSS SECTION A-A'

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- Potential current exposure under current land use conditions inside plant operations area to contaminants in surface water and sediment, surface soil, and springs through incidental ingestion and dermal contact, and inhalation.

- Potential future exposure under future land use conditions inside plant operations area to contaminants in surface water and sediment, surface soil, and springs

- Future exposure of onsite residents to contaminants in the surface water and sediment, surface soil, subsurface soils, groundwater, and springs through ingestion, inhalation, and direct contact;

- Future exposure of potential onsite construction workers to contaminants in soil (surface and subsurface) through incidental ingestion and direct contact; and to contaminants in groundwater, surface water, and sediment through direct contact.

6.0 SUMMARY OF SITE RISKS

CERCLA directs the Agency to protect human health and the environment from current and future exposures to hazardous substances at Superfund sites. In order to assess the current and future risks from the NSCC Site, a baseline risk assessment was conducted in conjunction with the RI. This section of the ROD summaries the findings concerning the impact to human health and the environment if contaminated media (i.e., groundwater) at the Site were not remediated. The baseline risk assessment for OU #3 is incorporated into the June 2, 1993 OU #3 RI Report which can be found in the NSCC OU #3 Administrative Record.

The risks posed by Site soils will be summarized in OU #4.

6.1 CONTAMINANTS OF CONCERN

Table 8 provides a comprehensive list of all of the contaminants identified as chemicals of concern in the groundwater at the Site. The contaminants and concentrations of these contaminants detected in the groundwater are the major contributors to the significant risk for this Operable Unit. The following sections will concentrate on the risks posed by contaminants listed in Table 8.

The extent of the plumes are shown in Figures 3, 4, and 7 and the concentrations of contaminants detected in the groundwater are presented in Tables 2, 3, 4, and 5.

There are residents within a three-mile radius to the Site who obtain drinking water from private wells. The nearest private potable wells are approximately 400 feet north of the NSCC property line. These private potable wells are completed in the bedrock formation.

6.2 EXPOSURE ASSESSMENT

The objective of the exposure assessment is to estimate the type and magnitude of potential exposures to the chemicals of concern that are present at the Site. The results of the exposure assessment are combined with chemical-specific toxicity information to characterize potential risks. The exposure assessment involves the following four (4) major steps:

- characterization of the physical setting and identification of human receptors
- identification of potential land-use scenarios
- Identification of potential exposure pathways
- quantification of intakes.

The following pathways were evaluated in the risk assessment for each of the environmental media adversely impacted by Site activities. For soils, they included:

- Incidental ingestion of soil

- Dermal contact with soil.

For groundwater, they included:

- Incidental ingestion of groundwater at springs (current)

- Dermal contact with groundwater ar springs (current)

- Ingestion of groundwater as drinking water (future)

- Dermal contact with groundwater during domestic water use (future)

- Inhalation of volatile chemicals partitioning to the air from groundwater during domestic water use.

Table 8 provides the reasonable maximum exposure concentrations which were used in calculating the carcinogenic and noncarcinogenic risks associated with each chemical of concern in the groundwater.

The surface water and sediment pathways were evaluated for a current and future trespasser (age 7-16 years) and a future child resident (age 1-12 years) for incidental ingestion, dermal absorption and inhalation exposure to chemicals of potential concern in these media. The exposure frequency and duration for the trespasser scenario were 143 days per year and 10 years, and 286 days per year and 12 years for the resident scenario. The body weight was 45 kilograms for the trespasser and 22.5 kilograms for the resident. The exposure duration was the same for exposure to spring water; the frequency of exposure was 71 days per year for the trespasser and 143 days per year for the child resident.

As stated previously, the contaminants and concentrations of these contaminants detected in the groundwater are the major contributors to the significant risk for this Operable Unit and the only chemical of concern in the surface water is 1,2-DCA. Although, the impacted groundwater is not currently being used as a drinking water source, the aquifer itself is being used as a source of drinking water; therefore, this resource should be maintained at drinking water quality. Table 10 lists the specific parameters used to model the site-specific groundwater intakes for OU #3. The exposure point concentrations for surface water outside the plant operations area and inside the plant operations area in the Northeast Tributary are 1.04 milligrams per liter (mg/l) and 1.26 mg/l.

6.3 TOXICITY ASSESSMENT

The toxicity assessment was conducted to further determine the potential hazard posed by the chemicals of concern for which exposure pathways have been identified. Available evidence is weighed in regards to the potential of particular contaminants to cause adverse effects in exposed individuals and to provide, where possible, an estimate of the relationship between the extent of exposure to a contaminant and the increased likelihood and/or severity of adverse effects.

Cancer slope factors (CSFs) have been developed by EPA's carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CSFs, which are expressed in units of milligrams/kilogram/day[-1] [(mg/kg/day)[-1]], are multiplied by the estimated intake of a potential carcinogen, in (mg/kg/day), to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CSF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. CSFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (R[f]Ds) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic (systemic) effects. R[f]Ds, which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, which will result in no adverse health effects. Estimated intakes of chemicals from environmental media (i.e., the amount of chemical ingested from contaminated drinking water) can be compared to the R[f]D. R[f]Ds are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (i.e., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the R[f]Ds will not underestimate the potential for adverse noncarcinogenic effects to occur.

The Agency has derived CSFs and R[f]Ds for the contaminants of concern at the Site for use in determining the upper-bound level of cancer risk and non-cancer hazard from exposure to a given level of contamination. These values are provided in Table 11.

6.4 RISK CHARACTERIZATION

The risk characterization step of the baseline risk assessment process integrates the toxicity and exposure assessments into quantitative and qualitative expressions of risk. The output of this process is a characterization of the site-related potential noncarcinogenic and carcinogenic health effects.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may be reasonably exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The HQs and HIs for the exposure pathways (current and future) identified at the Site are listed in Table 12.

The HQ is calculated as follows:

Non-cancer HQ = CDI/R[f]D, where:

CDI = Chronic Daily Intake

R[f]D = reference dose; and

CDI and R[f]D are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

For carcinogens, risk are estimated as the incremental probability of an individual developing cancer over a life-time as a result of exposure to the carcinogen. Table 12 provides the computed chemical intakes values along with the calculated risks. Excess life-time cancer risk is calculated from the following equation:

Risk = CDI x SF, where:

Risk = a unit less probability (e.g., 2×10^{-5}) of an individual developing cancer;

CDI = chronic daily intake averaged over 70 years (mg/kg-day); and SF = slope-factor, expressed as $(mg/kg\text{-}day)^{-1}$

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (i.e., 1×10^{-6} or 1E-6). An excess lifetime cancer risk of 1E-6 indicates that, as a plausible upper-bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

EPA has set an acceptable carcinogenic risk range of 1E-4 to 1E-6; however, depending upon site factors, a risk of 1E-4, may be considered protective. Where the cumulative carcinogenic site risk to an individual is less than 1E-4 and the noncarcinogenic HQ is less than 1, a RA is generally not warranted. If an RA is initiated at a Superfund site, then the Agency strives to achieve a residual cancer risk of no greater than 1E-6.

The carcinogenic upper-bound risk for each of the exposure pathways (current and future) identified at the Site are summarized in Table 13. The cumulative future risk and hazard index posed by the groundwater at the Site is 2 x 10[-3] and 60 for a child, respectively. The only chemical that exceeded EPA's risk range in surface water and spring water was 1,2-DCA.

6.5 RISK UNCERTAINTY

There is a generally recognized uncertainty in human risk values developed from experimental data. This is primarily due to the uncertainty of extrapolation in the areas of (1) high to low dose exposure and (2) animal data to values that are protective of human health. Other major uncertainties of the NSCC OU #3 human health baseline risk assessment are: uncertainties associated with predicting future land use, uncertainties associated with estimating chemical concentrations at receptor locations, uncertainties with the toxicity assessment, and uncertainties associated with assumptions used in the exposure models. Use of upperbound estimates tends to overestimate exposure and the effect of more than one upperbound parameter tends to produce an conservative estimate. The assumption that future exposure concentrations will be equal to current concentrations increases uncertainty because environmental concentrations appear to vary over time. And the assumption that residences will be constructed on the plant operations area under the future land-use scenario also adds to the uncertainty.

Models used to predict exposure concentrations have inherit uncertainties associated with them. These uncertainties are associated with predicting the movement of the contaminants and the receptors as well as the assumptions made (e.g., skin surface area, soil adherence factors, and absorption coefficients for soil and water).

6.6 ENVIRONMENTAL RISK

The ecological risk assessment for OU #3 evaluated risks to the aquatic and benthic (bottom-dwelling) organisms in the Northeast Tributary. These organisms can be exposed to site-related contaminants in surface water and/or sediment. The main ecological contaminant of concern in this tributary is 1,2-DCA. To determine if there were any effects of 1,2-DCA on the benthic communities inhabiting the Northeast Tributary, a Rapid Bioassessment Protocol was used to conduct an ecological field assessment during Phase I of the RI for OU #3. Results indicated that tributary segments with historically elevated 1,2-DCA levels (adjacent to the plant operations area) were devoid of sensitive macrobenthic species and exhibited generally lower taxa richness and abundance than the reference station. However, the benthic assemblages were not dominated by taxa known to be tolerant of chemical stress. This portion of the Northeast Tributary is located near the stream's headwater area. In view of the naturally-limiting factors associated with a headwater stream of this type, ecological impacts resulting from the presence of 1,2-DCA in the Northeast Tributary could not be determined.

During Phase II of the OU #3 RI, chronic toxicity tests were performed on surface water and sediment samples to further examine the ecological impairments noted during the field assessment. Surface water tests were conducted using fathead minnows and water fleas, while amphipods and water fleas were used for whole sediment tests. The measurement endpoints (survival, growth, or reproduction) did not differ significantly between site samples (containing elevated levels of 1,2-DCA) and reference or laboratory samples (containing little or no 1,2-DCA). These test results initially suggested that ecological impairments observed in the Northeast Tributary resulted from natural stresses rather than the presence of 1,2-DCA or other chemical contaminants. However, chemical analysis of surface water samples collected at the same time and locations as those for the toxicity tests indicated that the level of 1,2-DCA in the sample collected adjacent to the Site (200 ug/l, estimated value) had decreased below historic levels for that area (800-3200 ug/l) and was below the screening level (2000 ug/l) thought to be potentially toxic to aquatic organisms.

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6.7 SUMMARY

Actual or threatened releases of hazardous substances, from this Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment. Presently, no unacceptable current risks were identified associated with the NSCC Site. The unacceptable risks connected with the Site are associated with the potential future use of the groundwater beneath and downgradient of the Site as a potable source of water and the potential adverse impact contaminated soils will have on groundwater quality. The unacceptable, future risk is due to the presence of contaminants at concentrations above EPA's MCLs for drinking water and the State of North Carolina groundwater quality standards. These contaminants will be remediated during the remedial action phase.

Presently, no substantive link has been made between the presence of 1,2-DCA in the Northeast Tributary and the limited biodiversity in this stream as the area of the stream impacted by the Site is approximately 1,500 feet from the head-water of this stream. However, the RI report did conclude that the source of 1,2-DCA in the Northeast Tributary is the contaminated groundwater in the saprolite zone of the aquifer discharging into this stream. Since very high concentrations of 1,2-DCA (660,000 g/l) have been found in the groundwater, the potential for discharge of groundwater contaminants above levels of ecological concern is possible. Hence it is necessary to institute long-term monitoring of the Northeast Tributary.

7.0 REMEDIAL ACTION OBJECTIVES

Section 5.0 defined the extent and characterized the contamination and the environmental setting of OU #3. Section 6.0 highlighted the human health and environmental risks posed by the Site. This Section specifies the remedial action objectives to protect human health and the environment by preventing exposure to the contaminants in the groundwater and surface water/sediment associated with OU #3.

The specific remedial action objectives and general response actions for the environmental media adversely impacted by the Site addressed in this ROD are listed in Table 14.

7.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Section 121(d) of CERCLA, as amended by SARA, requires that remedial actions comply with requirements or standards set forth under Federal and State environmental laws. The requirements that must be complied with are those laws that are applicable or relevant and appropriate (ARAR) to the (1) remedial action(s), (2) location, and (3) media-specific contaminations at the Site.

Applicable requirements defined in 40 C.F.R. [Para] 300.400(g)(1) are those requirements applicable to the release or RA contemplated based upon an objective determination of whether the requirements specifically addresses a hazardous substance, pollutant, contaminant, RA, location, or other circumstance found at a CERCLA site. These requirements would have to be met under any circumstance. Relevant and appropriate requirements defined in 40 C.F.R. [Para] 300.400(g)(2) are those requirements that address problems or situations sufficiently similar to the circumstances of the release or removal action contemplated, and whether the requirement is well suited to the Site. The action-, chemical-, and location-specific ARARs for the selected remedial alternative are listed in Table 17.

7.2 EXTENT OF CONTAMINATION

The extent and volume of contaminated soils will be addressed in OU #4 ROD.

Figures 3, 4, and 7 delineate the estimated periphery of the plumes in the groundwater associated with OU #3. These plume estimates are based on contamination levels detected in the groundwater as well as where there were no detections of contaminants in the groundwater.

Calculations were performed to estimated the volume of groundwater which needs to be remediated. By using an estimated surface area of 748,481 square feet, a saturated aquifer thickness of 26 feet in the saprolite and 100 feet in the bedrock, and an aquifer porosity of 35 percent in the saprolite and 5 percent in the bedrock, the quantity of contaminated groundwater in one pore volume of the aquifer was estimated to be 131 million gallons.

8.0 DESCRIPTION OF ALTERNATIVES

Due to an insufficient evaluation of soil remediation technologies in the June 21, 1993 FS document, this ROD will only address the remediation of groundwater and surface water/sediment. Soil remediation in Area 2 and lagoon area will be addressed in OU #4.

Table 15 inventories those technologies that passed the initial screening for remediating the contaminated groundwater and surface water/sediment at OU #3. In the initial screening, process options and entire technologies were eliminated from consideration if they are difficult to implement due to Site constraints or contaminant characteristics, or if the technology has not been proven to effectively control the contaminants of concern. Table 15 also presents the results of the final screening of the groundwater remediation technologies. Effectiveness, implementability, and relative capital and operation and maintenance costs are the criteria used for evaluating the technologies and process options in the final screening. The process options that were retained for further evaluation are boxed in by a bold line. This table provides the rationale as to why certain technologies were not retained for the detailed comparison.

The five (5) groundwater remediation alternatives retained to address the estimated 131 million gallons of contaminated groundwater and the two (2) surface water/sediment remediation alternatives are described below.

8.1 REMEDIAL ALTERNATIVES TO ADDRESS GROUNDWATER CONTAMINATION

Although the groundwater alternatives for addressing contaminated groundwater for Area 2 and the lagoon area were considered separately in the FS, they were combined in this ROD. Area 2 alternatives are identified by "P" for the "Plant" and the alternatives dealing with the contaminated groundwater associated with the lagoon area are identified by "L" for "Lagoon Area".

Alternative GWP1/GWL1:

No action

Alternative GWP2/GWL2:
Long-Term Monitoring with Fencing A Portion of Northeast Tributary

Alternative GWP3/GWL3:
Institutional Controls with Fencing A Portion of Northeast Tributary

Alternative GWP4A/GWL4A:
Groundwater Extraction, Air Stripping, Vapor-Phase Carbon Adsorption, Discharge to Publicly Owned Treatment Works (POTW) (i.e., local sewer system)

Alternative GWP4B/GWL4B:
Groundwater Extraction, Air Stripping, Fume Incineration, Discharge to POTW

The point of compliance for all the groundwater alternatives listed above for OU #3 is defined as throughout the entire plume of contamination in accordance to 40 CFR 300.430(a)(1)(iii)(F) which states "EPA expects to return usable ground waters to their beneficial uses where practicable, within a timeframe that is reasonable given the particular circumstances of the site. When restoration of ground water to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water and evaluate further risk reduction."

8.1.1 ALTERNATIVE GWP1/GWL1: No action

The No Action alternative is included, as required by CERCLA, to establish a baseline for comparing the benefits achieved by the other groundwater remediation alternatives. Under these alternatives, no cleanup activities would be implemented to remediate the groundwater adversely impacted by past Site activities (i.e., the Site is left "as is"). Because these alternatives do not entail contaminant removal or destruction, hazardous materials would remain on Site requiring a review of the Site remedy every five years in accordance with CERCLA Section 121(c). The implementation of this remedy could begin immediately and would have no negative impact on future remedial actions.

A slight reduction in the levels of contamination may occur over time through natural processes; however, the levels in the groundwater would remain above the groundwater cleanup goals for up to 70 years. Although there is no current unacceptable risk associated with the contaminated groundwater, this situation would change immediately if a potable well was installed near the Site. The reason there is no current risk is because nobody in the vicinity of the adversely impacted groundwater is using this groundwater as a source of drinking water. However, if a potable well was installed in or near the plume, the risk would increase to 2 x 10^{-3}. Since this alternative does not involve any treatment or other remedial action, the reduction in the toxicity, mobility, or volume (TMV) of the contaminated groundwater at the Site would result from natural processes.

There are no capital costs associated with this alternative; however, operation and maintenance (O&M) costs would be incurred for conducting the five year reviews. This review includes monitoring the groundwater under the Site once every five years as well for a period of 30 years.

<Figure>
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Capital Costs: $ 0
Annual O&M Costs: $ 22,000
Total PW Costs for 30 Years: $ 227,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

8.1.2 ALTERNATIVE GWP2/GWL2: Long Term Monitoring and Fencing A Portion Of Northeast Tributary

This alternative is analogous to Alternative GWP1/GWL1, except under Alternative GWP2/GWL2 additional monitoring wells would be installed, groundwater monitoring data would be collected annually instead of once every five years, and a portion of the Northeast Tributary would be fenced. Extending the existing fence line to inclose additional portions of the Northeast Tributary is a precautionary action to reduce the future likelihood of exposing children to unacceptable levels of contaminants in the Northeast Tributary via dermal absorption, ingestion, and/or inhalation. As stated in Section 6.0, the current levels of contaminants in the Northeast Tributary do not pose an unacceptable risk. However, under this alternative, the contaminated groundwater is not actively remediated which could lead to higher levels of contaminants entering the Northeast Tributary along with the groundwater. This increase in concentrations of contaminants entering the stream may result in unacceptable exposure concentrations in either water column or sediment or both.

Capital Costs: $ 178,000
Annual O&M Costs: $ 138,000
Total PW Costs for 30 Years: $1,479,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

8.1.3 ALTERNATIVE GWP3/GWL3: Institutional Controls, Long Term Monitoring, and Fencing A Portion Of Northeast Tributary

This alternative is identical to Alternative GWP2/GWL2, except Alterative GWP3/GWL3 includes institutional controls. No remediation activities would be conducted for groundwater. The additional costs are associated with preparing and filing deed restriction(s) and implementing any other institutional controls. The specific institutional controls to be implemented include: using deed restrictions to control the installation of new wells on plant property; track plume migration; and install fencing around the Northeast Tributary to limit access to contaminated surface water and sediment.

This alternative provides no reduction in TMV of the contaminants; however, it can reduce or eliminate direct exposure pathways and the resultant risk to the public. As part of this alternative, the groundwater would be monitored on a yearly basis. As EPA may not have the authority to implement these institutional controls, the responsibility rests on the PRP ensure the institutional controls are in place, are reliable, and will remain in place after initiation of O&M. Groundwater monitoring and the five year CERCLA review would be conducted for 30 years.

Capital Costs: $ 198,000
Annual O&M Costs: $ 138,000
Total PW Costs for 30 Years: $1,500,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

8.1.4 ALTERNATIVE GWP4A/GWL4A: Groundwater Extraction Through Wells; Treatment by Air Stripping with Vapor-Phase Carbon Adsorption; and Discharge to POTW

This alternative includes extracting groundwater by means of extraction wells downgradient of both areas, Area 2 and the lagoon area; volatile organics removal through air stripping; control of emissions to the atmosphere from the air stripper through vapor-phase carbon adsorption; and combined discharge with treated groundwater from OU-1 to the Salisbury publicly owned treatment works (POTW). The treated effluent must meet permit limits set by the Salisbury POTW. Spent activated carbon would be changed out and sent to a commercial regeneration/recycling facility, destroyed through incineration, or disposed in an appropriately regulated landfill. The five year review CERCLA requirement would apply to this alternative.

Capital Costs: $1,437,000
Annual O&M Costs: $ 740,000
Total PW Costs for 30 Years: $5,792,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

8.1.5 ALTERNATIVE GWP4B/GWL4B: Groundwater Extraction Wells, Treatment by Air Stripping with Fume Incineration; and Discharge to POTW

This alternative is identical to Alternative GWP4A, except that the control of emissions to the atmosphere from the air stripper would be accomplished through fume incineration.

Capital Costs: $1,679,000
Annual O&M Costs: $ 659,000
Total PW Costs for 30 Years: $5,270,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

8.2 REMEDIAL ALTERNATIVES TO ADDRESS SURFACE WATER AND SEDIMENT CONTAMINATION

8.2.1 ALTERNATIVE SW/SE-1: No Action

No further activities would be conducted on surface water or the sediment in the Northeast Tributary. As with Alternative GWP1/GWL1, this stream would be left "as is". Samples would be collected and analyzed every five years as part of the five year review CERCLA requirement which would apply to this alternative.

Capital Costs: $ 0
Annual O&M Costs: $ 16,000
Total PW Costs for 30 Years: $151,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

8.2.2 ALTERNATIVE SW/SE-2: Long-Term Monitoring

This alternative is similar to Alternative SW/SE-1, except under Alternative SW/SE-2, surface water and sediment samples would be collected from the Northeast Tributary annually instead of once every five years.

Capital Costs: $ 0
Annual O&M Costs: $ 92,000
Total PW Costs for 30 Years: $867,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 8.0 describes the remedial alternatives that were evaluated in the detailed analysis of alternatives set forth in the June 21, 1993 OU #3 Feasibility Study Report. This section summarizes the detailed evaluation of these remedial alternatives in accordance with the nine (9) criteria specified in the NCP, 40 CFR Section 300.430(e)(9)(iii). This section summarizes the comparison of the groundwater and surface water/sediment remedial alternatives; the soils remedial alternative will be addressed under OU #4.

9.1 THRESHOLD CRITERIA

In order for an alternative to be eligible for selection, it must be protective of both human health and the environment and comply with ARARs; however, the requirement to comply with ARARs can be waived in accordance to 40 CFR Section 300.430(f)(1)(ii)(C). Table 16 summarizes the evaluation of the five (5) groundwater and two (2) surface water/sediment remedial alternatives with respect to the threshold criteria.

9.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This criterion assesses the alternatives to determine whether they can adequately protect human health and the environment from unacceptable risks posed by the contamination at the Site. This assessment considers both the short-term and long-term time frames.

Under current conditions, the groundwater does not pose an unacceptable risk to human health or the environment. And in contemplating future use scenarios for the Site in the Risk Assessment, the scenario that typically results in manifesting the greatest risk, using contaminated groundwater as potable water, the overall risk posed by the Site was 2 x 10[-3].

Alternatives GWP2/GWL2, GWP3/GWL3, GWP4A/GWL4A, and GWP4B/GWL4B, provide adequate protection for human health by preventing ingestion of potentially contaminated groundwater and surface water. Alternatives GWP4A/GWL4A and GWP4B/GWL4B would afford the greatest protection to human health because it would substantially reduce the contamination in the groundwater and prevent the potential for exposure through use of existing or future off site wells. Alternatives GWP4A/GWL4A and GWP4B/GWL4B would indirectly remediate the surface water and sediment, since the groundwater remediation would decrease the potential for contaminants to reach the tributary via groundwater discharge. Both of these alternatives would eliminate the potential for exposure via ingestion of these media. These alternatives protect the environment by removing contaminants from groundwater, controlling the extent of groundwater contamination, and reducing the contamination in the tributary and downstream surface waters. Alternative GWP3/GWL3 would not be as protective of the environment because contamination would continue to migrate into the tributary through groundwater discharge. Neither Alternatives GWP1/GWL1 nor GWP2/GWL2 would provide protection for human health. Natural degradation/attenuation of contaminants in the subsurface is not anticipated to prevent the potential migration of contaminants off site, although such processes may reduce the amount and concentration of contaminants which would eventually leave the Site.

Under present conditions, both Alternatives SW/SE-1 and SW/SE-2 would be protective of human health, but may not be protective of the environment. If higher concentrations are discharged into the stream along with the groundwater, then both alternatives may not be protective of human or the environment.

9.1.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This criterion assesses the alternatives to determine whether they attain ARARs under federal and state environmental laws, or provide justification for waiving an ARAR. Site specific ARARs are identified in Table 17.

MCLs and State groundwater quality standards are ARARs for Site groundwater. By leaving contaminants above these standards in the groundwater, Alternatives GWP1/GWL1, GWP2/GWL2, and GWP3/GWL3 would not comply with these ARARs. Therefore, these alternatives would not achieve the requirements of the NCP. Alternatives GWP4A/GWL4A and GWL4B/GWL4B would obtain performance standards for groundwater (MCLs and North Carolina Groundwater Standards), surface water and sediment at the point of compliance. These alternatives would also comply with action- and location-specific ARARs related to the construction and operation of the groundwater extraction, treatment, and discharge systems to be installed under these Alternatives. The discharge to the POTW and air emission associated with Alternatives GWP4A/GWL4A and GWL4B/GWL4B will also satisfy all appropriate ARARs. The disposal of any sludge or spent activated carbon created by the groundwater treatment system will also comply with the appropriate ARARs.

There are no Federal or State ARARs for the contaminants detected in the surface water or sediment originating from the Site. However, the long-term monitoring requirement associated with SW/SE-2, if done inconjunction with remediation of the groundwater, would serve to verify that groundwater contaminants are not migrating into the tributary at levels of concern for human health or the environment.

9.2 PRIMARY BALANCING CRITERIA

These criteria are used to evaluate the overall effectiveness of a particular remedial alternative. This evaluation is summarized in Table 18.

9.2.1 LONG-TERM EFFECTIVENESS AND PERMANENCE

This criterion assesses the long-term effectiveness and permanence an alternative will afford as well as the degree of certainty to which the alternative will prove successful.

Under Alternatives GWP1/GWL1, GWP2/GWL2, and GWP3/GWL3 groundwater contamination would not be actively remediated; therefore these alternatives cannot be considered to be permanent or effective remedial solutions as these alternatives do not remove, treat, or isolate subsurface contamination. The long-term effectiveness of Alternatives GWP1/GWL1 and GWP2/GWL2 is questionable, because of the time it would require for "Nature" to clean "Itself". These remedies would rely on the natural attenuation and the flowing groundwater to eventually remove all the contaminants that have entered the groundwater at the Site. Alternative GWP3/GWL3 would prevent potential future risk by preventing the installation of drinking wells in any areas exceeding MCLs or North Carolina Groundwater Standards. Alternatives GWP4A/GWL4A and GWP4B/GWL4B would provide an effective and permanent solution for groundwater, surface water, and sediment because the chemicals of concern would be removed from the groundwater and destroyed and prevent them from migrating into the surface water and sediment of the tributary via groundwater discharge. The reliability of Alternatives GWP4A/GWL4A and GWP4B/GWL4B is high and these alternatives would not pose a human health or environmental risk at the point of compliance and no treatment residuals would be left on Site. Five-year CERCLA mandated reviews will be required for all of the alternatives.

Under current conditions, both Alternatives SW/SE-1 and SW/SE-2 would be protective of human health, but may not be protective of the environment. If higher concentrations of contaminants begin discharging into the tributary, then neither of these alternatives may be protective of human or the environment.

9.2.2 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

This criterion assesses the degree to which the alternative employs recycling or treatment to reduce the TMV of the contaminants present at the Site. Alternatives GWP4A/GWL4A and GWP4B/GWL4B would reduce the toxicity and volume of contamination in groundwater through removal and treatment. They would also reduce the toxicity and volume of contamination in surface water and sediment. The groundwater treatment processes associated with these two alternatives would completely comply with the statutory preference for alternatives that reduce toxicity of contaminants. Alternatives GWP1/GWL1, GWP2/GWL2, and GWP3/GWL3 do not directly reduce toxicity, mobility, or volume of groundwater, surface water or sediment contamination.

Alternatives SW/SE-1 and SW/SE-2 could lead to a reduction of VOCs in the tributary; however, neither of these alternatives would result in the destruction of the VOCs. These contaminants would transfer from the tributary to the atmosphere through the process of volatilization.

9.2.3 SHORT-TERM EFFECTIVENESS

This criterion assesses the short-term impact of an alternative to human health and the environment. The impact during the actual implementation of the remedial action is usually centered under this criterion.

All of the alternatives for both groundwater and surface water/sediment can be implemented without significant risk to the community or on-site workers and without adverse environmental impacts.

9.2.4 IMPLEMENTABILITY

This criterion assesses the ease or difficulty of implementing the alternative in terms of technical and administrative feasibility and the availability of services and materials.

None of the alternatives for both groundwater and surface water/sediment pose significant concerns regarding implementation. The design of the treatment systems for Alternatives GWP4A/GWL4A and GWP4B/GWL4B cannot be completed until the discharge requirements are defined by the Salisbury POTW. This will occur during the RD.

9.2.5 COST

This criterion assesses the cost of an alternative in terms of total present worth cost (PW). Total PW was calculated by combining the capital cost plus the PW of the annual O&M costs. Capital cost includes engineering and design, mobilization, Site development, equipment, construction, demobilization, utilities, and sampling/analyses. Operating costs were calculated for activities that continue after completion of construction, such as routine operation and maintenance of treatment equipment, and groundwater monitoring. The PW of an alternative is the amount of capital required to be deposited at the present time at a given interest rate to yield the total amount necessary to pay for initial construction costs and future expenditures, including O&M and future replacement of capital equipment.

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More detailed information on the development of the total present worth costs for each alternative can be found in Section 8.

Alternative GWP1/GWL1
No Action $227,000

Alternative GWP2/GWL2
Long-Term Monitoring, Fence Portion of Northeast Tributary: $1,479,000

Alternative GWP3/GWL3
Institutional Controls, Long-Term Monitoring, Fence Portion of Northeast Tributary:$1,500,000

Alternative GWP4A/GWL4A
Groundwater Extraction/Air Stripping/Vapor-Phase Carbon Adsorption/POTW Discharge: $5,792,000

Alternative GWP4B/GWL4B
Groundwater Extraction/Air Stripping/Fume Incineration/POTW Discharge :$5,270,000

Alternative SW/SE-1
No Action $151,000

Alternative SW/SE-2
Long-Term Monitoring $867,000

9.3 MODIFYING CRITERIA

State and community acceptance are modifying criteria that shall be considered in selecting the remedial action.

9.3.1 STATE OF NORTH CAROLINA ACCEPTANCE

The State of North Carolina has reviewed and provided EPA with comments on the reports and data from the RI and the FS. NCDEHNR has also reviewed the Proposed Plan and EPA's preferred alternative and conditionally concurs with the selected remedy as described in Section 10. The State's correspondence providing conditional concurrence, along with the specific conditions, and the Agency's response to the stipulated conditions can be found in Appendix A.

9.3.2 COMMUNITY ACCEPTANCE

The Proposed Plan Fact Sheet was distributed to interested residents, to local newspapers and radio and TV stations, and to local, State, and Federal officials on July 15, 1993. The Proposed Plan public meeting was held in the evening of August 3, 1993. The public comment period on the Proposed Plan began July 19, 1993 and closed on September 16, 1993.

Written comments were received from the City of Salisbury and NSCC during the public comment period. The questions asked during the August 3, 1993 public meeting and the Agency's response to the written comments are summarized in the Responsiveness Summary, Appendix A. Since no input was received from the community at large, it is infeasible to assess the community's acceptance of the proposed remedy.

10.0 DESCRIPTION OF THE SELECTED REMEDY

As stated previously, the soil remediation alternative will be addressed in OU #4. Alternative GWP3/GWL3 and GWP4A/GWL4A was selected for groundwater and SW/SE-2 for the surface water/sediment in the Northeast Tributary. Briefly, the selected remedy for this Site is:

- Implement a deed restriction as the institutional control.

- Long-term monitoring of the groundwater and the surface water/sediment in the Northeast Tributary.

- Design and implementation of a groundwater remediation system. The selected groundwater remediation alternative consists of a groundwater extraction system consisting of extraction wells, an air stripping process to remove the VOCs, control of emissions from the air stripper to the atmosphere through vapor-phase carbon adsorption filters, and combining the effluent with the treated groundwater from OU #1 and the facility's operation effluent to be discharged to the City of Salisbury POTW system.

- Delineate the vertical extent of groundwater contamination in the bedrock.

- More accurately evaluate the direction and speed of the flow of groundwater in the bedrock.

- Conduct a review of the existing groundwater monitoring system to insure proper monitoring of both groundwater quality and groundwater flow so that the effectiveness of the groundwater extraction system can be evaluated. Additional monitoring wells and/or piezometers will be added to mitigate any deficiencies.

- Alternative GWP3/GWL3 also includes fencing a portion of the Northeast Tributary. However, since the groundwater extraction system will reduce and then eliminate contamination migrating into the Northeast Tributary, it will not be necessary to install this fence. This condition will be evaluated in the 5 year CERCLA review.

This remedy will reduce the levels of contamination in the groundwater to below their Federal MCLs and State groundwater quality standards.

10.1 PERFORMANCE STANDARDS TO BE ATTAINED

Table 17 list the action-specific, chemical-specific, and location-specific Site specific ARARs.

Performance standards include any applicable or relevant and appropriate standards/requirements, cleanup levels, or remediation levels to be achieved by the remedial action. The surface water and groundwater performance standards to be met/attained by the NSCC OU #3 RA are listed in Table 19.

Table 19 provides the remediation goals to be achieved at this Site along with the range and frequency of detection for the listed contaminants. This table also lists the risk level associated with each remediation goal. These risks are based on the reasonable maximum exposure (RME) levels and summarizes the information provided in Tables 8, 9, 10, 11, 12, and 13.

10.2 GROUNDWATER REMEDIATION

The groundwater remediation alternatives selected for the OU #3 at the NSCC Site are GWP3/GWL3 and GWP4A/GWL4A - Institutional Controls, Long-term Monitoring, Groundwater Extraction and

Physical Treatment (Air Stripping) with Control of Air Emissions Via Vapor-Phase Carbon Adsorption Filters, and Discharge to POTW. A description of the selected remedial alternative follows.

The contaminated aquifer will be remediated by removal of contaminated groundwater through extraction wells until the performance standards specified in Table 19 are achieved. Figures 3, 4, and 7 delineates the estimated periphery of the plumes emanating from OU #3. The extracted groundwater from Area 2 and the lagoon area will be combined for treatment. Following treatment of the extracted groundwater, the groundwater will be discharged into the sewer system along with the rest of the NSCC influent to the City of Salisbury POTW.

It is anticipated that four (4) extracting wells, two (2) installed in the saprolite and 2 into the bedrock, downgradient of Area 2 and six (6) extraction wells, three (3) installed in the saprolite and 3 into the bedrock, downgradient of the lagoon area will be required. The Area 2 bedrock and saprolite extraction wells would have an estimated combined flow of 15 gallons per minute (gpm) and 10 gpm, respectively. The lagoon area bedrock and saprolite extraction wells will have an estimated combined flow of 6 gpm and 30 gpm, respectively. At these pumping rates, it is anticipated that these wells will achieve and maintain a sufficient drawdown in the underlying aquifer to contain and remove the plumes of contamination. The extraction wells will be located within and near the sources of contamination. The extracted groundwater will be treated in an above-ground, on-site air stripper. The actual number, placement, pumping rate of each extraction well, the size of the air stripping unit, and the size of the vapor-phase activated carbon adsorption units will be determined in the RD. The air stripper will be designed to achieve the pretreatment requirements which will be determined by the City of Salisbury POTW. The only anticipated by-product to be generated by the groundwater treatment process described above is spent activated carbon. The activated carbon may be regenerated, destroyed, or disposed of in an appropriately regulated landfill. The most cost effective option for dealing with the spent activated carbon will be implemented. The estimated volume of groundwater adversely impacted by past Site activities is 131 million gallons.

Groundwater contamination may be especially persistent in the immediate vicinity of the contaminants' source where concentrations are relatively high. The ability to achieve cleanup goals at all points throughout the area of attainment, or plume, cannot be determined until the extraction system has been implemented, modified as necessary, and plume response monitored over time. If the selected remedy cannot meet the specified performance standards, at any or all of the monitoring points during implementation, the contingency measures and goals described in this section may replace the selected remedy and goals for these portions of the plume.

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The goal of this remedial action is to restore the groundwater to its beneficial use, as defined in Section 7.4. Based on information obtained during the RI, and the analysis of all of the remedial alternatives, EPA and the State of North Carolina believe that the selected remedy may be able to achieve this goal.

Such contingency measures will, at a minimum, prevent further migration of the plume and include a combination of containment technologies and institutional controls. These measures are considered to be protective of human health and the environment, and are technically practicable under the corresponding circumstances.

The selected remedy will include groundwater extraction for an estimated period of 30 years, during which time the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the followings:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points

c) pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into groundwater;

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

To ensure that cleanup continues to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occurrence of every 2 years following discontinuation of groundwater extraction.

If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial use, all of the following measures involving long-term management may occur, for an indefinite period of time, as a modification of the existing system:

a) engineering controls such as physical barriers, or long-term gradient control provided by low level pumping, as contaminant measure;

b) chemical-specific ARARs may be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction;

c) institutional controls may be provided/maintained to restrict access to those portions of the aquifer which remain above remediation goals;

d) continued monitoring of specified wells; and/or

e) periodic reevaluation of remedial technologies for groundwater restoration.

The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at 5 year intervals in accordance with CERCLA Section 121(c).

The RA shall comply with all ARARs listed in Table 17. The presence of contamination in the groundwater will require deed restrictions to document their presence and could limit future use of the area known to be affected by the contaminated groundwater.

10.3 NORTHEAST TRIBUTARY SURFACE WATER/SEDIMENT REMEDIATION

It is anticipated that the groundwater remediation alternative described above will initially reduce and then eliminate contamination in the Northeast Tributary as the source of this contamination is the contaminated groundwater discharging into the stream. Alternative SW/SE-2 requires long-term monitoring of the water column and sediment to insure that the groundwater remediation is reducing the levels of contamination in the Northeast Tributary.

Initially, each annual sampling effort will collect paired surface water and sediment samples at a minimum of four (4) sampling locations. These samples shall be analyzed for TCL VOCs. After the groundwater extraction system becomes operational and the levels of contamination in the Northeast Tributary obtain the performance standards specified in Table 19 for two consecutive sampling events, the number of sampling points and the sampling frequency may be reduced.

10.4 MONITOR EXISTING CONDITIONS/ADDITIONAL DATA REQUIREMENTS

In addition to the work described above, this ROD and the RD will also have to address a number of data gaps.

Since the RI was not able to completely delineate the extent of the groundwater contamination in the bedrock zone of the aquifer, additional monitoring wells will need to be installed during the RD. It is anticipated that at least two (2) bedrock monitoring wells are needed to better portray the vertical extent of contamination as well as delineate the depth to which bedrock is fractured. To determine to what depth the bedrock is fractured, bedrock cores will need to be collected. The analytical data generated from the samples collected from these bedrock wells should provide sufficient information to determine if contaminants have migrated to this depth. The placement of these and any other additional monitoring wells will be made after a review and evaluation of the existing groundwater monitoring system. This review is to insure that the groundwater monitoring system will provide adequate information to assess the long-term quality of the groundwater and to demonstrate the effectiveness of the groundwater extraction system. This review effort may also require the need for additional groundwater modeling and aquifer testing. If a contaminant is found above its groundwater remediation standard specified in Table 19 in the deeper regions of the bedrock, then the groundwater extraction system shall be extended to include this lower region of the bedrock zone of the aquifer and all the requirements specified in Sections 10.0, 10.1 and 10.2 of this ROD will apply.

In order to help establish a broader data base on groundwater quality additional groundwater samples will be collected and analyzed. Below are listed the wells to be sampled, how frequently these wells are to be sampled, and the chemical analyses to be performed on each groundwater sample collected. This sampling effort will continue until the groundwater remediation system is functional and the monitoring procedures specified in the Operation and Maintenance Manual are implemented.

Monitoring Well To Be Sampled	Sampling Frequency	Samples Are To Be Analyzed For	Analytical Procedure To Be Used
Saprolite Wells			
NS-13	Annually	VOCs, TAL metals	EPA Methods 8240 + 6010
NS-14	Annually	VOCs	EPA Method 8240
NS-33	Annually	VOCs	EPA Method 8240
NS-35	Biannually	VOCs, TAL metals	EPA Methods 8240 + 6010
NS-37	Annually	VOCs	EPA Method 8240
NS-39	Annually	VOCs	EPA Method 8240
NS-42	Biannually	VOCs, TAL metals	EPA Methods 8240 + 6010
NS-43	Annually	VOCs	EPA Method 8240
Bedrock Wells			
NS-34	Annually	VOCs	EPA Method 8240
NS-36	Biannually	VOCs, TAL metals	EPA Methods 8240 + 6010
NS-38	Annually	VOCs	EPA Method 8240
NS-40	Biannually	VOCs, TAL metals	EPA Methods 8240 + 6010
NS-41	Annually	VOCs	EPA Method 8240
NS-44	Annually	VOCs	EPA Method 8240

10.5 COST

The total present worth costs for the selected alternatives is

Alternative GWP3/GWL3:	$1,500,000
Alternative GWP4A/GWL4A:	$5,792,000
Alternative SW/SE-2:	$ 867,000
TOTAL PRESENT WORTH COST	$8,159,000

The break down of this cost is specified below.

The present worth cost components of the institutional controls, long-term monitoring, groundwater extraction, air stripping, emissions control of off-gas via vapor-phase activated carbon filtration, and discharging to the local POTW are:

TOTAL CONSTRUCTION COSTS	$1,635,000
TOTAL PW O&M COSTS (at annual PW O&M Costs of $878,000)	$6,524,000
TOTAL PRESENT WORTH COST	$8,159,000

11.0 STATUTORY DETERMINATION

Based on available information, the selected remedy satisfies the requirements of Section 121 of CERCLA, as amended by SARA, and the NCP. The remedy provides protection of human health and the environment, is cost-effective, utilizes permanent solutions to the maximum extent practicable, and satisfies the statutory preference for remedies involving treatment technologies.

11.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy will permanently treat the groundwater. Dermal, ingestion, and inhalation contact with Site contaminants will be eliminated and risks posed by continued groundwater contamination will be abated.

11.2 COMPLIANCE WITH ARARS

The selected remedy will be designed to meet all Federal or more stringent State environmental laws. A complete list of the ARARs which are to be attained is included in Table 17. No waivers of Federal or State requirements are anticipated for OU #3.

11.3 COST-EFFECTIVENESS

The selected groundwater remediation technologies are more cost-effective than the other acceptable alternatives considered. The selected remedy will provide greater benefit for the cost because it permanently removes the contaminants from the impacted aquifer.

11.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized for this action. Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State have determined that the selected remedy provides the best balance of trade-offs in terms of: long-term effectiveness and permanence; reduction in mobility, toxicity, or volume achieved through treatment; short-term effectiveness, implementability, and cost; State and community acceptance; and the statutory preference for treatment as a principal element.

11.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The preference for the treatment of contaminated groundwater is satisfied by the use of the groundwater extraction system, the air stripper to remove volatile contaminants from the groundwater, and control of the air stripper off-gas via vapor-phase activated carbon adsorption at the Site. Further treatment of the discharged groundwater will be achieved at the POTW. The principal threats at the Site will be eliminated by use of these treatment technologies.

12.0 SIGNIFICANT CHANGES

CERCLA Section 117(b) requires an explanation of any significant changes from the preferred alternative originally presented in the Proposed Plan (Appendix B). Below are the specific changes made in the ROD as well as the supporting rationale for making those changes. The Proposed Plan was disseminated to the public on July 15, 1993.

Alternative GWP3/GWL3 included installing a fence around a portion of the Northeast Tributary as it assumed that no remediation of the groundwater would occur. However, the selected remedy does call for the implementation of an active groundwater extraction system. The groundwater extraction system will reduce and then eliminate the contaminants entering into the surface water and sediment of the Northeast Tributary, thereby eliminating the need for this fence. This is the reason why the installation of the fence around a portion of the Northeast Tributary has been excluded from the selected remedy as described in Section 10.

The Proposed Plan reported the total present worth costs for Alternatives GWP4A, GWL4A, GWP4B, and GWL4B to be $2,222,000, $3,570,000, $2,274,000, and $2,996,000, respectively. These costs, obtained from the June 21, 1993 OU #3 FS report, were based on obtaining the cleanup goals at the point of compliance specified in said document. The FS proposed obtaining a groundwater cleanup goal of 5.0 g/l for 1,2-DCA at the periphery of the plume. However, the use of 5.0 g/l as a cleanup goal for 1,2-DCA and the selection of the periphery of the plume at point of compliance are in error. The most stringent promulgated cleanup level for 1,2-DCA can be found in the State's groundwater quality standards and is described in Section 10.1 as 1.0 g/l. The point of compliance, as described in Section 8.1, is throughout the entire plume. By changing these two conditions, the estimated remediation timeframe is lengthened which results in a different O&M cost for Alternatives GWP4A, GWL4A, GWP4B, and GWL4B. The total present worth costs for Alternative GWP4A/GWL4A becomes approximately $107,000 less than the total present worth costs for Alternative GWP4B/GWL4B. Since both alternatives achieve the same degree of protection and treatment, Alternative GWP4A/GWL4A is selected because it is more cost effective. Also, refer to Comment #9 in the Responsiveness Summary (Appendix C).

APPENDIX A
CONCURRENCE LETTER FROM THE STATE OF NORTH CAROLINA AND RESPONSE FROM THE AGENCY

September 23, 1993

Mr. Curt Fehn, Chief
NC Remedial Section
U.S. EPA Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365

Subj: Conditional Concurrence with the Record of Decision
National Starch and Chemical Company NPL Site
Salisbury, Rowan County, NC

Dear Mr. Fehn:

The Division of Solid Waste Management (DSWM) has completed review of the attached Draft Record of Decision and concurs with the selected remedy subject to the following conditions.

1. The NC Groundwater Standard for trans 1,2-dichloroethene is 70 ug/l not 100 ug/l as shown in the Draft ROD. The Performance Standard for this contaminant in Table 21 (page 109 of the Draft ROD) as well as the groundwater standard data in Table 4 (page 24 of the Draft ROD) should be corrected accordingly.

2. New State Groundwater Standards (15A NCAC 2L .0202) have been approved by the NC Environmental Management Commission and the Rules Review Committee. The new standards will take effect October 1, 1993. For acetone the new standard is 700 ug/l, and for xylene the new standard is 530 ug/l. These new standards are based on the latest health information and represent the best science. Furthermore, these are the standards that have been approved and will be in effect during the remedial efforts. Therefore, the Division of Solid Waste Management requests that the performance standards presently in the Draft ROD be modified to reflect the new NC Groundwater Standards.

3. DSWM concurrence on this Record of Decision and the selected remedy for the site is based solely on the information contained in the attached Draft Record of Decision. Should DSWM receive new or additional information which significantly affects the conclusions or remedy selection contained in the Record of Decision, it may modify or withdraw this concurrence with written notice to EPA Region IV.

4. DSWM concurrence on this Record of Decision in no way binds the State to concur in future decisions or commits the State to participate, financially or otherwise, in the clean up of the site. The State reserves the right to review, comment, and make independent assessments of all future work relating to this site.

The DSWM appreciates the opportunity to comment on the Revised Draft Record of Decision for the subject site, and we look forward to working with EPA on the final remedy. If you have any questions concerning these comments please contact Bruce Nicholson or me at (919) 733-2801.

Sincerely,

Jack Butler, PE
Environmental Engineering Supervisor
Superfund Section

cc: Michael Kelly
Bruce Nicholson
Jon Bornholm
Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET. N.E.
ATLANTA, GEORGIA 30365

SEP 24 1993

4WD-NCRS

Mr. Jack Butler, PE
Environmental Engineering Supervisor
Superfund Section
Division of Solid Waste Management
North Carolina Department of Environment, Health, and Natural Resources
P.O. Box 27687
Raleigh, North Carolina 27611-7687

RE: Conditional Concurrence on Operable Unit #3 Record of Decision for the National Starch & Chemical Company Superfund Site from North Carolina Division of Solid Waste Management

Dear Mr. Butler:

EPA-Region IV appreciates the Division of Solid Waste Management, North Carolina Department of Environment, Health, and Natural Resource's concurrence on the Record of Decision (ROD) for Operable Unit #3 at the National Starch & Chemical Company Superfund Site located in Salisbury, North Carolina. For the record, EPA would like to respond to your September 23, 1993 conditional concurrence letter. Your letter, along with this response, will be included in Appendix A of the ROD. These letters should stand as official documentation that EPA-Region IV and Division of Solid Waste Management have agreed on the preferred alternatives at this point in time.

For your information, the Agency has incorporated the State's groundwater standard of 70.0 g/l for trans-1,2-dichloroethene in all the appropriate tables. The Agency has also incorporated 700 g/l as the performance standard for acetone in the ROD.

Please contact me at (404) 3457-7791 if you have any questions or comments regarding this matter.

Sincerely yours,

Jon K. Bornholm
Remedial Project Manager

cc: Curt Fehn, EPA
Bruce Nicholson, NCDEHNR

APPENDIX B

PROPOSED PLAN FACT SHEET

SUPERFUND PROPOSED PLAN FACT SHEET

GROUNDWATER REMEDIATION FOR OPERABLE UNIT #3 FOR THE
NATIONAL STARCH & CHEMICAL COMPANY SUPERFUND SITE
Salisbury, Rowan County, North Carolina

July 1993

INTRODUCTION

This Proposed Plan identifies the preferred options for addressing the contaminated groundwater and surface water/sediment associated with Operable Unit #3 at the National Starch & Chemical Company Superfund Site in Salisbury, North Carolina. The term "Operable Unit" is used when individual actions are taken as a part of an overall site cleanup. A number of operable units can be used in the course of a site cleanup. (Terms in bold face print are defined in a glossary located at the end of this publication.) This document has been prepared and is being issued by the U.S. Environmental Protection Agency (EPA), the lead Agency for Site activities, and the North Carolina Department of Environment, Health and Natural Resources (NCDEHNR), the support agency. EPA, in consultation with NCDEHNR, directed and oversaw the Remedial Investigation and Feasibility Study, and will select a remedy for Operable Unit #3 only after the public comment period has ended and all information submitted to EPA during this time has been reviewed and considered.

EPA is issuing this Proposed Plan as part of its public participation responsibilities in accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund.

This document summarizes information that is explained in greater detail in the Remedial Investigation Report, the Feasibility Study Report, and other documents contained in the Information Repository/Administrative Record for this Site. EPA and the State encourage the public to review these documents to better understand the Site and the Superfund activities that have been conducted. The Administrative Record is available for public review locally at the Rowan Public Library at 201 West Fisher Street, Salisbury, North Carolina.

EPA, in consultation with NCDEHNR, may modify the preferred alternative or select another response action presented in this Plan and the Remedial Investigation and the Feasibility Study Reports based on new information and/or public comments. Therefore, the public is encouraged to review and comment on all alternatives identified here.

A fourth Operable Unit will be developed to address the contaminated soils and source of contamination at the Site in the near future.

THIS PROPOSED PLAN

1. Includes a brief background of the Site and the principal findings of Operable Unit #3 Site Remedial Investigation;

2. Presents the remedial (cleanup) alternatives for the Site considered by EPA;

3. Outlines the criteria used by EPA to recommend a remedial alternative for use at the Site;

4. Provides a summary of the analysis of the remedial alternatives;

5. Presents EPA's rationale for its preliminary selection of the preferred remedial alternatives; and

6. Explains the opportunities for the public to comment on the remedial alternatives.

PUBLIC MEETING:

DATE: August 3, 1993

LOCATION:
Agricultural Extension Center
2727 Old Concord Road
Salisbury, North Carolina

TIME: 7:00 PM - 9:00 PM

PUBLIC COMMENT PERIOD:
July 19, 1993 - August 17, 1993

<Figure>

SITE BACKGROUND

The National Starch & Chemical Company (NSCC) facility occupies 465 acres on Cedar Springs Road on the outskirts of Salisbury, North Carolina (refer to Figure 1). Presently, land use immediately adjacent to the Site is a mixture of residential and industrial developments. East and south of the Site are industrial parks consisting primarily of light industrial operations. The west and north sides of the NSCC property are bordered by residential developments. Refer to the Figure 2 for Site location.

A surface stream, referred to as the Northeast Tributary, crosses the NSCC property parallel to Cedar Spring Road and passes within 50 yards of the manufacturing area of the facility (refer to Figure 2). Surface water runoff from the eastern side of the facility discharges into this tributary. The focus of the Operable Unit #3 Remedial Investigation was to determine the source, nature, and extent of the contamination entering this stream.

Primarily, NSCC manufactures textile-finishing chemicals and custom specialty chemicals. Volatile and semi-volatile organic chemicals are used in the production process along with acidic and alkaline solutions. Acidic and alkaline solutions are also used in the cleaning processes. The waste stream from the manufacturing process includes wash and rinse solutions.

<Figure>

Operable Unit #3 focused on the areas of the facility referred to as Area 2 and the wastewater treatment lagoons (refer to Figure 3). Area 2 consists of the following operations: Area 2 Reactor Room, the Tank Room, Raw Material Bulk Storage, and the Warehouse. The lagoon area includes three lagoons. A fourth lagoon was installed in 1992 for pretreatment of contaminated groundwater as part of the Operable Unit #1 Remedial Action (RA).

As the result of finding contaminants in groundwater and in the surface water/sediment of the Northeast Tributary, the original scope of work specified in the initial Remedial Investigation/Feasibility Study Work Plan has been expanded twice. The first Remedial

Investigation and Feasibility Study resulted in the first Record of Decision (ROD) to be issued by the Agency on September 30, 1988 for the NSCC Superfund site. The findings of Operable Unit #2 Remedial Investigation/Feasibility Study led to the second Record of Decision, rendered by the Agency on September 30, 1990. As in Operable Unit #1 and Operable Unit #2, the work performed for Operable Unit #3 is being performed by National Starch & Chemical Corporation, the Potentially Responsible Party (PRP). The engineering contractor hired by the PRP to conduct Operable Unit #3 work is IT Corporation.

The NSCC site was proposed for inclusion on the National Priorities List in April 1985 and finalized on the list in October 1989. The Site had a Hazardous Ranking System score of 46.51. Only Sites with a Hazardous Ranking System score of 28.5 or higher are eligible to be placed on the National Priorities List.

SCOPE AND ROLE OF OPERABLE UNIT WITHIN SITE STRATEGY

As with many Superfund sites, the NSCC site is complex. Consequently, EPA divided the work into three manageable components called Operable Units (OU). These operable units are:

OU-1 · Groundwater in western portion of the NSCC property

OU-2 · Trench Area soils and surface water/sediments in the Northeast Tributary

OU-3 · Groundwater/surface water/sediments in the areas of Area 2, the lagoons, and the Northeast Tributary

RESULTS OF THE REMEDIAL INVESTIGATION FOR OU-3

Three environmental media (soils, groundwater, and surface water/sediment) have been adversely impacted by contamination originating from the NSCC plant and from past chemical handling and disposal practices of the facility. The primary contaminant at the Site is 1,2-dichloroethane (1,2-DCA). This contaminant is known as a chlorinated organic compound that volatilizes readily and is classified as a probable human carcinogen. A carcinogen is any substance that can cause or contribute to the development of cancer. Other organic chemicals were also detected. The chemicals of concern at the Site are (listed alphabetically): acetone, bis (2-chloroethyl) ether, bis (2-ethylhexyl) phthalate, 2-butanone, cadmium, carbon disulfide, chloroform, chloroethane, delta-BHC, 1,2-dichloroethene, di-n-butyl phthalate, di-n-octyl phthalate, ethyl benzene, methylene chloride, styrene, tetrachloroethene, toluene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride and total xylene. The following inorganics were also detected: aluminum, antimony, arsenic, barium, beryllium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, nickel,selenium, thallium, vanadium, and zinc.

The OU-3 soil investigation has generated ample information to characterize the contamination, determine the source, and define the extent of contamination in the vadose soil zone. The vadose zone is comprised of subsurface soil that is not saturated with water. The interface between the vadose zone and the saturated zone is commonly referred to as the water table. Fourteen different volatile organic compounds, one semi-volatile organic compound, and one pesticide were detected in the vadose soils. The primary source of contamination in Area 2 were buried, leaking terra-cotta piping used to transport waste streams from the production area to the treatment lagoons. The source of the contaminants detected in the lagoon area is the soil under and around the lagoons which were contaminated prior to the lagoons being lined with concrete.

OU-3 defined the nature of groundwater contamination (the contaminants present and their concentrations) but additional work is needed to completely define the extent of groundwater contamination, especially in the bedrock zone of the aquifer. The aquifer is subdivided into two interconnected zones, the shallow zone and the bedrock zone. Both of these zones have been adversely impacted by activities at the NSCC plant. Sixteen different volatile organic compounds and four semi-volatile organic compounds were detected in the groundwater. Groundwater in the shallow zone in the vicinity of the lagoons is flowing at an approximate speed of 80 feet per year. This rate slows to approximately 27 feet per year just east of the lagoon area.

The highest concentrations of contamination detected in the Northeast Tributary were found just east of the plant. The levels of these volatile organics decrease downstream as these contaminants volatilize into the atmosphere. Two samples, one surface water and one sediment, were collected from the Northeast Tributary just prior to the stream leaving the NSCC property and flowing under Airport Road. No contaminants were detected in these samples which indicates that the likelihood of contamination leaving the Site via surface water/sediment is minimal. The apparent source of the organics in this stream is the discharge of contaminated groundwater into the stream.

Inorganics were detected in all three of the environmental media sampled (soils, groundwater, and surface water and sediment). All of the metals detected are naturally occurring and the variation in concentrations detected does not indicate the Site is releasing inorganic contaminants into the environment.

<Figure>

SUMMARY OF SITE RISKS

A task of the Remedial Investigation/Feasibility Study is to analyze and estimate the human health and environmental problems that could result if the soil, groundwater, and surface water/sediment contamination is not cleaned up. This analysis is call a Baseline Risk Assessment. In calculating risks to a population if no remedial action is taken, EPA evaluates the reasonable maximum exposure levels for current and future exposure scenarios to Site contaminants. Scenarios were developed for residents living on or near to the Site as well as for employees working on the Site. In conducting this assessment, EPA focuses on the adverse human health effects that could result from long-term daily, direct exposure as a result of ingestion, inhalation, or dermal contact to carcinogenic chemicals (cancer causing) as well as the adverse health effects that could result from long-term exposure to non-carcinogenic chemicals present at the Site. EPA considers a long-term resident beginning as a young child being exposed daily for 30 years to be a reasonable maximum exposure scenario for future exposure to the NSCC site.

A goal of the Agency is to reduce the risk posed by a Superfund Site to fewer than one person out of 10,000 being at risk of developing cancer. This is the minimum risk the Agency will allow, typically the Agency aspires to be even more protective and strives to lower the risk so that at a minimum, only one person out of one million may be adversely impacted by the contamination found at a Superfund Site.

EPA has concluded that there are no major current risks to human health at the Site. Exposure pathways evaluated in the Risk Assessment were ingestion, inhalation, and direct contact to contaminants in the soil, groundwater, and surface water/sediment. The only reason groundwater does not pose a current risk is because the contamination in the groundwater has not migrated beyond the property boundary and consequently, has not impact any private, potable well. There are no potable wells located on Site.

However, there are three unacceptable future carcinogenic risks associated with the contamination at the Site. The first scenario resulting in an unacceptable future risk is having residents living in homes built on or near the Site and using the groundwater as potable water. Another unacceptable future risk is the exposure of a child to surface water, sediment, and spring water. The third unacceptable future risk involves exposing individuals to contaminated subsurface soil. The future residential use of the groundwater would also result in an unacceptable future risk due to the presence of noncarcinogenic chemicals in the groundwater.

A semi-quantitative assessment of the Northeast Tributary was also conducted as part of the Risk Assessment. This environmental assessment included chemical, ecological, and toxicological investigations of the surface water and sediment collected from the Northeast Tributary. The data generated by the environmental assessment found adverse ecological impacts in areas of the stream where elevated levels of 1,2-DCA were detected. However, the assessment could not conclude that the contaminants originating from the Site, primarily 1,2-DCA, are the sole cause of this impact. There is a strong indication that the naturally-limiting factors of the stream itself results in the diminished numbers of benthic (bottom-dwelling) organisms in this section of the Northeast Tributary.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) were developed based on the results of the Risk Assessment, an examination of potential Applicable or Relevant and Appropriate Requirements (ARARs), and threats to groundwater and the Northeast Tributary. Action-, location-, and chemical-specific ARARs were examined. Chemical-specific ARARs for groundwater include maximum concentration levels (MCLs) as specified in the Safe Drinking Water Act and North Carolina Groundwater Standards. In summary, the Remedial Action Objectives are:

FOR GROUNDWATER

- For Human Health: Prevent ingestion of water having concentrations of 1,2-DCA resulting in cancer risks above acceptable limits.

- For Environmental Protection: None, groundwater concentrations have not been found to represent an environmental hazard.

FOR SURFACE WATER

- For Human Health: None, surface water is not a drinking water source.

- For Environmental Protection: None, surface water concentrations have not been identified as the sole cause for the limited benthic populations.

FOR SEDIMENT

- For Human Health: Prevent direct contact with sediments having levels of 1,2-DCA resulting in cancer risks above acceptable limits.

- For Environmental Protection: None.

The objective of a remediation is to obtain stringent health risk levels. For groundwater, all chemical-specific ARARs, which include MCLs and the North Carolina Groundwater Standards, will be achieved where the specified concentration is technically detectable. The estimated volume of contaminated groundwater requiring remediation is 131 million gallons.

For more information about the Remedial Action Objectives and alternatives for the NSCC OU-3 site, please refer to the June 21, 1993, Feasibility Study document and other documents available for review at the Administrative Record located at the Rowan Public Library.

SUMMARY OF REMEDIAL ALTERNATIVES

The following section provides a summary of the alternatives developed in the Feasibility Study (FS) Report. The primary objective of the Feasibility Study was to determine and evaluate alternatives for cleaning up the Site. Descriptions of the clean-up alternatives are summarized below. The Report contains a more detailed evaluation/description of each alternative.

The cost information provided below for each alternative represents estimated total present worth (PW) of each alternative. Total present worth was calculated by combining the capital cost plus the present worth of the annual operating and maintenance (O&M) costs. Capital cost includes construction, engineering and design, equipment, and site development. Operating costs were calculated for activities that continue after completion of construction, such as routine operation and maintenance of treatment equipment, and groundwater monitoring. The present worth of an alternative is the amount of capital required to be deposited at the present time at a given interest rate to yield the total amount necessary to pay for initial construction costs and future expenditures, including operation and maintenance and future replacement of capital equipment.

REMEDIAL ALTERNATIVES TO ADDRESS GROUNDWATER CONTAMINATION

The groundwater remedial alternatives for addressing contaminated groundwater were considered separately for Area 2 and the lagoon area. Area 2 alternatives are identified by "P" for the Plant and the alternatives dealing with the contaminated groundwater associated with the lagoon area are identified by "L".

ALTERNATIVES GWP1 AND GWL1: No Action

Capital Costs: $ 0
Annual O&M Costs: $ 22,000
Total PW Costs for 30 Years: $ 227,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

CERCLA requires that the "No Action" alternative be evaluated at every Superfund Site to establish a baseline for comparison. No further activities would be conducted with regard to the groundwater beneath the Site under this alternative (i.e., the Site is left "as is"). Because these alternatives do not entail contaminant removal or destruction, a review of the remedy would be conducted every five years in accordance with CERCLA Section 121(c). Operating costs are based on conducting this review every five years which includes monitoring the groundwater under the Site once every five years for a period of 30 years.

ALTERNATIVES GWP2 AND GWL2: LONG TERM MONITORING, FENCING A PORTION OF NORTHEAST TRIBUTARY

Capital Costs: $ 178,000
Annual O&M Costs: $ 138,000
Total PW Costs for 30 Years: $1,479,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

These alternatives are similar to Alternatives GWP1 and GWL1, except under Alternatives GWP2/GWL2 additional monitoring wells would be installed, groundwater monitoring data would be collected annually instead of once every five years, and a portion of the Northeast Tributary would be fenced.

ALTERNATIVES GWP3 AND GWL3: INSTITUTIONAL CONTROLS, FENCING A PORTION OF NORTHEAST TRIBUTARY

Capital Costs: $ 198,000
Annual O&M Costs: $ 138,000
Total PW Costs for 30 Years: $1,500,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

These alternatives for groundwater contamination in Area 2 and the lagoon area are identical to Alternatives GWP2 and GWL2, except Alternative GWP3/GWL3 includes institutional controls. No remediation activities would be conducted for groundwater. The additional costs are associated with preparing and filing deed restriction(s) and implementing the other institutional controls. The specific institutional controls to be implemented include: using deed restrictions to control the installation of new wells on both the plant property and adjacent property; track plume migration; and install fencing around the Northeast Tributary to limit access to contaminated surface water and sediment. A "plume" is the discharge of a contaminant from a given point of origin in water or air, for example, smoke from a smokestack.

These alternatives provide no reduction in volume, mobility or toxicity of the contaminants, however, they can reduce or eliminate direct exposure pathways and the resultant risk to the public. As part of these alternatives, the groundwater would be monitored on a yearly basis. As EPA may not have the authority to implement these institutional controls, the responsibility rests with the State of North Carolina to ensure the institutional controls are in place, are reliable, and will remain in place after initiation of O&M. Therefore, the responsibility for implementing and enforcing institutional controls fails on the State of North Carolina. Groundwater monitoring and five year CERCLA reviews would be conducted for 30 years. The O&M cost is for both Area 2 and the lagoon area.

ALTERNATIVE GWP4A: GROUNDWATER EXTRACTION THROUGH WELLS AND TREATMENT BY AIR STRIPPING WITH VAPOR-PHASE CARBON ADSORPTION

Capital Costs: $ 648,000
Annual O&M Costs: $ 306,000
Total PW Costs for 30 Years: $2,222,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

This alternative includes extracting groundwater by means of extraction wells downgradient of Area 2; volatile organics removal through air stripping; control of emissions to the atmosphere from the air stripper through vapor-phase carbon adsorption; and combined discharge with treated groundwater from OU-1 to the Salisbury publicly owned treatment works (POTW). The treated effluent must meet permit limits set by the Salisbury POTW. Spent activated carbon would be changed out and sent to a commercial regeneration/recycling facility. The five year review CERCLA requirement would apply to this alternative.

ALTERNATIVE GWL4A: GROUNDWATER EXTRACTION WELLS, TREATMENT BY AIR STRIPPING WITH VAPOR-PHASE CARBON ADSORPTION

Capital Costs: $ 789,000
Annual O&M Costs: $ 434,000
Total PW Costs for 30 Years: $3,570,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 20 years

This alternative is identical to Alternative GWP4A except this alternative addresses contaminated groundwater associated with the lagoon area.

ALTERNATIVE GWP4B: GROUNDWATER EXTRACTION WELLS, TREATMENT BY AIR STRIPPING WITH FUME INCINERATION

Capital Costs: $ 766,000
Annual O&M Costs: $ 299,000
Total PW Costs for 30 Years: $2,274,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

This alternative is identical to Alternative GWP4A, except that the control of emissions to the atmosphere from the air stripper would be accomplished through fume incineration.

ALTERNATIVE GWL4B: GROUNDWATER EXTRACTION WELLS, TREATMENT BY AIR STRIPPING WITH FUME INCINERATION

Capital Costs: $ 913,000
Annual O&M Costs: $ 360,000
Total PW Costs for 30 Years: $2,996,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

This alternative is identical to Alternative GWP4B except for this alternative addresses contaminated groundwater associated with the lagoon area.

ALTERNATIVE GWP4C: GROUNDWATER EXTRACTION WELLS, TREATMENT BY LIQUID-PHASE CARBON ADSORPTION

Capital Costs: $ 788,000
Annual O&M Costs: $ 432,000
Total PW Costs for 30 Years: $4,305,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

This alternative includes extracting groundwater by means of extraction wells downgradient of Area 2; volatile organics removal through liquid-phase carbon adsorption and combined discharge with treated groundwater from OU-1 discharge to the Salisbury POTW. The treated effluent must meet permit limits set by the Salisbury POTW. Spent activated carbon would be regenerated. The five year review CERCLA requirement would apply to this alternative.

ALTERNATIVE GWL4C: GROUNDWATER EXTRACTION WELLS, TREATMENT BY LIQUID-PHASE CARBON ADSORPTION

Capital Costs: $ 987,000

Annual O&M Costs: $ 941,000
Total PW Costs for 30 Years: $8,375,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 20 years

This alternative is identical to Alternative GWP4C except this alternative addresses contaminated groundwater associated with the lagoon area.

ALTERNATIVE GWL5A: GROUNDWATER EXTRACTION WELLS, TREATMENT BY AIR STRIPPING WITH VAPOR-PHASE CARBON ADSORPTION, IN-SITU BIOREMEDIATION REQUIRING GROUNDWATER INJECTION OF NUTRIENTS

Capital Costs: $1,093,000
Annual O&M Costs: $ 798,000
Total PW Costs for 30 Years: $7,477,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

This alternative includes extracting groundwater by means of extraction wells located downgradient of the lagoons; volatile organics removal through air stripping; control of emissions to the atmosphere from the air stripper through vapor-phase carbon adsorption; combining a portion of the discharged groundwater with treated groundwater from OU-1 for discharging to the Salisbury POTW, polishing the remaining portion of the groundwater by air stripping to cleanup goals before injecting the treated groundwater along with nutrients into the contaminated area to promote in-situ biodegradation of the contaminants. "In-situ" means to keep in place (i.e., the treatment is conducted in its original place). The treated effluent being discharged to the Salisbury POTW must meet permit limits set by the Salisbury POTW. Spent activated carbon would be regenerated. The five year review CERCLA requirement would apply to this alternative.

ALTERNATIVE GWL5B: GROUNDWATER EXTRACTION WELLS, TREATMENT BY AIR STRIPPING WITH FUME INCINERATION, IN-SITU BIOREMEDIATION REQUIRING GROUNDWATER INJECTION OF NUTRIENTS

Capital Costs: $1,365,000
Annual O&M Costs: $ 733,000
Total PW Costs for 30 Years: $7,000,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

This alternative is similar to Alternative GWL5A except control of emissions of the vapor coming from the first air stripper would be accomplished through the use of a fume incineration.

ALTERNATIVE GWL5C: GROUNDWATER EXTRACTION THROUGH WELLS, TREATMENT BY LIQUID-PHASE CARBON ADSORPTION, IN-SITU BIOREMEDIATION REQUIRING GROUNDWATER INJECTION OF NUTRIENTS

Capital Costs: $ 1,216,000
Annual O&M Costs: $ 1,631,000
Total PW Costs for 30 Years: $13,853,000
Time to Design: 1 year
Construction Time: 6 months
Duration to Achieve Clean-up: 15 to 30 years

This alternative includes extracting groundwater by means of extraction wells located downgradient of the lagoons; volatile organics removal through liquid-phase carbon adsorption; combining a portion of the discharge with treated groundwater from OU-1 for discharging to the Salisbury POTW; the remaining portion of the treated groundwater would be re-injected, along with nutrients, back into the contaminated area to promote in-situ biodegradation of the contaminants. The treated effluent being discharged to the Salisbury POTW will meet permit limits set by the POTW. Spent activated carbon would be changed out and sent to a commercial regeneration facility. The five year review CERCLA requirement would apply. The treated effluent must meet permit limits set by the POTW. The five year review CERCLA requirement would apply to this alternative.

REMEDIAL ALTERNATIVES TO ADDRESS SURFACE WATER AND SEDIMENT CONTAMINATION

ALTERNATIVE SW1/SD1: NO ACTION

Capital Costs: $ 0
Annual O&M Costs: $ 16,000
Total PW Costs for 30 Years: $151,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

No further activities would be conducted on surface water or the sediment in the Northeast Tributary. As with Alternative GWP1/GWL1, this stream would be left "as is". Samples would be collected and analyzed every five years as part of the five year review CERCLA requirement which apply to this alternative.

ALTERNATIVE SW2/SD2: LONG-TERM MONITORING

Capital Costs: $ 0
Annual O&M Costs: $ 92,000
Total PW Costs for 30 Years: $867,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

This alternative is similar to Alternative SW1/SD1, except under Alternative SW2/SD2, surface water and sediment samples would be collected from the Northeast Tributary annually instead of once every five years.

CRITERIA FOR EVALUATING REMEDIAL ALTERNATIVES

EPA's selection of the preferred cleanup alternative for the NSCC OU-3 site, as described in this Proposed Plan, is the result of a comprehensive evaluation and screening process. The Feasibility Study for the Site was conducted to identify and analyze the alternatives considered for addressing contamination at the Site. The Feasibility Study and other documents for the NSCC OU-3 site describe, in detail, the alternatives considered, as well as the process and criteria EPA used to narrow the list to potential remedial alternatives to address the Site contamination. As stated previously, all of these documents are available for public review in the information repository/administrative record.

Alternatives GWP4C, GWL4C, GWL5A, GWL5B, and GWL5C were not retained for the detailed analysis because the other alternatives would achieve the same degree of protection for human health and the environment but at a substantially lower cost.

EPA always uses the following nine criteria to evaluate alternatives identified in the Feasibility Study. The remedial alternative selected for a Superfund site must achieve the two threshold criteria as well as attain the best balance among the five evaluation criteria. The nine criteria are as follows:

THRESHOLD CRITERIA

1. Overall protection of human health and the environment: The degree to which each alternative eliminates, reduces, or controls threats to public health and the environment through treatment, engineering methods or institutional controls.

2. Compliance With Applicable or Relevant and Appropriate Requirements (ARARs): The alternatives are evaluated for compliance with all state and federal environmental and public health laws and requirements that apply or are relevant and appropriate to the site conditions.

EVALUATING CRITERIA

3. Cost: The benefits of implementing a particular remedial alternative are weighed against the cost of implementation. Costs include the capital (up-front) cost of implementing an alternative over the long term, and the net present worth of both capital and operation and maintenance costs.

4. Implementability: EPA considers the technical feasibility (e.g., how difficult the alternative is to construct and operate) and administrative ease (e.g., the amount of coordination with other government agencies that is needed) of a remedy, including the availability of necessary materials and services.

5. Short-term effectiveness: The length of time needed to implement each alternative is considered, and EPA assesses the risks that may be posed to workers and nearby residents during construction and implementation.

6. Long-term effectiveness: The alternatives are evaluated based on their ability to maintain reliable protection of public health and the environment over time once the cleanup goals have been met.

7. Reduction of contaminant toxicity, mobility, and volume: EPA evaluates each alternative based on how it reduces (1) the harmful nature of the contaminants, (2) their ability to move through the environment, and (3) the volume or amount of contamination at the site.

MODIFYING CRITERIA

8. State acceptance: EPA requests state comments on the Remedial Investigation and Feasibility Study reports, as well as the Proposed Plan, and must take into consideration whether the state concurs with, opposes, or has no comment on EPA's preferred alternative.

9. Community acceptance: To ensure that the public has an adequate opportunity to provide input, EPA holds a public comment period and considers and responds to all comments received from the community prior to the final selection of a remedial action.

EVALUATION OF ALTERNATIVES

The following summary profiles the performance of the preferred alternatives in terms of the nine evaluation criteria noting how it compares to the other alternatives under consideration.

The comparative analysis for the groundwater remediation alternatives is as follows:

GROUNDWATER REMEDIATION

The following alternatives were subjected to detailed analysis for migration control:

Alternative GWP1: No action with regard to the groundwater in Area 2

Alternative GWP2: Long-Term Groundwater Monitoring of in Area 2 with Fencing A Portion of Northeast Tributary

Alternative GWP3: Institutional Controls with regard to the groundwater in Area 2 with Fencing A Portion of Northeast Tributary

Alternative GWP4A: Groundwater Extraction Through Wells Downgradient of Area 2 and Treatment By Air Stripping with Vapor-Phase Carbon Adsorption with Combined Discharge to the Salisbury POTW

Alternative GWP4B: Groundwater Extraction Through Wells Downgradient of Area 2 and Treatment By Air Stripping With Fume Incineration with Combined Discharge to the Salisbury POTW

Alternative GWL1: No Action with regard to the groundwater in the lagoon area

Alternative GWL2: Long-Term Groundwater Monitoring of in the lagoon area with Fencing A Portion of Northeast Tributary

Alternative GWL3: Institutional Controls with regard to the groundwater in the lagoon area with Fencing A Portion of Northeast Tributary

Alternative GWL4A: Groundwater Extraction Through Wells Downgradient of the Lagoon Area and Treatment By Air Stripping with Vapor-Phase Carbon Adsorption with Combined Discharge to the Salisbury POTW

Alternative GWL4B: Groundwater Extraction Through Wells Downgradient of the Lagoon Area and Treatment By Air Stripping With Fume Incineration with Combined Discharge to the Salisbury POTW

Overall Protection: Alternatives GWP2, GWL2, GWP3, GWL3, GWP4A, GWL4A, GWP4B, and GWL4B provide adequate protection for human health by preventing ingestion of potentially contaminated groundwater and surface water. Alternatives GWP4A, GWP4B, GWL4A, and GWL4B would afford the greatest protection to human health because it would substantially reduce the contamination in the groundwater and prevent the potential for exposure through use of existing or future off site wells. Alternatives GWP4A, GWP4B, GWL4A, and GWL4B would also remediate the surface water and sediment, which would eliminate the potential for exposure via ingestion of these media. These alternatives protect the environment by removing contaminants from groundwater, controlling the extent of groundwater contamination, and reducing the contamination in the tributary and downstream surface waters. Neither Alternatives GWP3 nor GWL3 would protect the environment because contamination would continue to migrate into the tributary through groundwater discharge. None of the Alternatives GWP1, GWL1, GWP2, or GWL2 will provide protection for either human health or the environment. Natural degradation/attenuation of contaminants in the subsurface is not anticipated to prevent the potential migration of contaminants off site, although such processes may reduce the amount and concentration of contaminants.

Compliance with ARARs: Alternatives GWP4A, GWP4B, GWL4A, and GWL4B would obtain performance standards for groundwater (MCLs and North Carolina Groundwater Standards), surface water and sediment at the point of compliance. These alternatives would also comply with location- and action-specific ARARs related to the discharge to the POTW and air emission controls. Alternatives GWP1, GWL1, GWP2, GWL2, GWP3, and GWL3 are not expected to meet performance standards at the point of compliance, however, Alternatives GWP3 and GWL3 would comply with the location-specific ARAR related to operations at a hazardous waste site.

Long-term Effectiveness and Permanence: Alternatives GWP4A, GWP4B, GWL4A, and GWL4B would provide an effective and permanent solution for groundwater, surface water, and sediment because the chemicals of concern would be removed from the groundwater and destroyed. The reliability of these alternatives is high. These alternatives would not pose a human health or environmental risk at the point of compliance and no treatment residuals would be left on Site. Alternatives GWP3 and GWL3 would prevent potential future risk by preventing the installation of drinking wells in any areas exceeding MCLs or North Carolina Groundwater Standards. Alternatives GWP1, GWL1, GWP2, and GWL2 will not be protective of human health and the environment in the long term because these alternatives do not remove, treat, or isolate subsurface contamination. Five-year CERCLA mandated reviews will be required for all of the alternatives.

Reduction of Toxicity, Mobility or Volume: Alternatives GWP4A, GWP4B, GWL4A, and GWL4B would reduce the toxicity and volume of contamination in groundwater through removal and treatment. They would also reduce the toxicity and volume of contamination in surface water and sediment. Alternatives GWP1, GWL1, GWP2, GWL2, GWP3, and GWL3 do not directly reduce toxicity, mobility, or volume of groundwater, surface water or sediment contamination.

Short-term Effectiveness: All of the alternatives can be implemented without significant risk to the community or on-site workers and without adverse environmental impacts.

Implementability: None of the alternatives pose significant concerns regarding implementation.

Cost: Total present worth costs (based on 30 years) for the groundwater alternatives are presented below:

Alternatives GWP1/GWL1 - No action: $227,000

Alternatives GWP2/GWL2 - Long-Term Monitoring with Fencing A Portion of Northeast Tributary: $1,479,000

Alternatives GWP3/GWL3 - Institutional Controls with Fencing A Portion of Northeast Tributary: $1,500,000

Alternative GWP4A - Groundwater Extraction/Air Stripping/Vapor-Phase Carbon Discharge: $2,222,000

Alternative GWP4B - Groundwater Extraction/Air Stripping/Fume Incineration/POTW Discharge: $2,274,000

Alternative GWL4A - Groundwater Extraction/Air Stripping/Vapor-Phase Carbon Adsorption/POTW Discharge: $3,570,000

Alternative GWL4B - Groundwater Extraction/Air Stripping/Fume Incineration/POTW Discharge: $2,996,000

SURFACE WATER/SEDIMENT

The following alternatives were subject to detailed analysis for surface water and sediment remediation:

Alternative SW1/SD1: No Action

Alternative SW2/SD2: Long-Term Monitoring

Overall Protection: Under present conditions, both Alternatives SW1/SD1 and SW2/SD2 would be protective of human health, but may not be protective of the environment.

If higher concentrations of contaminants are discharged into the stream from the groundwater, then neither alternative may be protective of human health nor the environment.

Compliance with ARARs: There are no Federal or State ARARs for the contaminants detected in the surface water or sediment.

Long-term Effectiveness and Permanence: Under current conditions, Alternatives SW1/SD1 and SW2/SD2, would be protective of human health but possibly not the environment. If higher concentrations of contaminants begin discharging into the tributary, none of these alternatives may be protective of human health.

Reduction of Toxicity, Mobility or Volume: Both Alternatives SW1/SD1 and SW2/SD2 could lead to a reduction of volatile contaminants in the tributary, however, neither of these alternatives would result in the destruction of the volatile contaminants. These contaminants would be transferred from the tributary to the atmosphere through the process of volatilization.

Short-term Effectiveness: All of the alternatives can be implemented without significant risk to the community or on-site workers and without adverse environmental impacts.

Implementability: None of the alternatives pose significant concerns regarding implementation.

Cost: Total present worth costs (based on 30 years) for the surface water/sediment alternatives are presented below:

Alternative SW1/SD1 - No Action:$151,000

Alternative SW2/SD2 - Long-Term Monitoring: $867,000

State Acceptance: The NCDEHNR has reviewed and provided EPA with comments on the reports and data from the RI and the FS. The NCDEHNR has also reviewed this proposed plan and EPA's preferred alternative and presently concurs with EPA's selection.

Community Acceptance: Community acceptance of the preferred alternative will be evaluated after the public comment period ends and a response to each comment will be included in a Responsiveness Summary which will be a part of the Record of Decision (ROD) for the Site.

EPA'S PREFERRED ALTERNATIVE

After conducting a detailed analysis of all the feasible cleanup alternatives based on the criteria described in the previous sections, EPA is proposing a cleanup plan to address groundwater, surface water, and sediment contamination at the Site. The EPA preferred alternatives are:

GROUNDWATER REMEDIATION

ALTERNATIVES GWP3B AND GWL3B: Long-Term Monitoring/Institutional Controls; ALTERNATIVE GWP4B: Groundwater Extraction Through Wells and Treatment By Air Stripping with Fume Incineration; and ALTERNATIVE GWL4B: Groundwater Extraction Through Wells and Treatment By Air Stripping with Fume Incineration and Combine Treated Groundwater with Groundwater from OU1 for Discharge to the Salisbury POTW

At a cost of $1,500,000, $2,279,000, and $2,996,000.

SURFACE WATER/SEDIMENT

ALTERNATIVE SW2/SD2: Long-Term Monitoring   Cost: $867,000

An active groundwater remediation alternative would reduce the levels of contamination in both the surface water and sediment as the source of this contamination is the discharge of contaminated groundwater along the section of the Northeast Tributary.

OVERALL TOTAL PRESENT WORTH COST OF $7,637,000

Based on current information, these alternatives appear to provide the best balance of trade-offs with respect to the nine criteria that EPA uses to evaluate alternatives. EPA believes the preferred alternative will satisfy the statutory requirement of Section 121(b) of CERCLA, 42 USC 9621(b), which provides that the selected alternative be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent solutions and treatments to the maximum extent practicable. The selection of the above alternatives is preliminary and could change in response to public comments.

COMMUNITY PARTICIPATION

EPA has developed a community relations program as mandated by Congress under Superfund to respond to citizen's concerns and needs for information, and to enable residents and public officials to participate in the decision-making process. Public involvement activities undertaken at Superfund sites consist of interviews with local residents and elected officials, a community relations plan for each site, fact sheets, availability sessions, public meetings, public comment periods, newspaper advertisements, site visits, and Technical Assistance Grants, and any other actions needed to keep the community informed and involved.

EPA is conducting a 30-day public comment period from July 19, 1993 to August 17, 1993, to provide an opportunity for public involvement in selecting the final cleanup method for this Site. Public input on all alternatives, and on the information that supports the alternatives is an important contribution to the remedy selection process. During this comment period, the public is invited to attend a public meeting on August 3, 1993, at the Agricultural Extension Center Auditorium, 2727 Old Concord Road, Salisbury, North Carolina beginning at 7:00 p.m. at which EPA will present the Remedial Investigation/Feasibility Study and Proposed Plan describing the preferred alternative for treatment of the contaminated groundwater at the National Starch & Chemical Company Superfund Site and to answer any questions. Because this Proposed Plan Fact Sheet provides only a summary description of the cleanup alternatives being considered, the public is encouraged to consult the information repository for a more detailed explanation.

During this 30-day period, the public is invited to review all site-related documents housed at the information repository located at the Rowan County Public Library, 201 West Front Street, Salisbury, North Carolina and offer comments to EPA either orally at the public meeting which will be recorded by a court reporter or in written form during this time period. The actual remedial action could be different from the preferred alternative, depending upon new information or statements EPA may receive as a result of public comments. If you prefer to submit written comments, please mail them postmarked no later than midnight August 17, 1993 to:

Diane Barrett
NC Community Relations Coordinator
U.S.E.P.A. Region 4
North Remedial Superfund Branch
345 Courtland Street, NE
Atlanta, GA 30365

All comments will be reviewed and a response prepared in making the final determination of the most appropriate alternative for cleanup/treatment of the Site. EPA's final choice of a remedy will be issued in a Record of Decision (ROD). A document called a Responsiveness Summary summarizing EPA's response to all public comments will also be issued with the ROD. Once the ROD is signed by the Regional Administrator it will become part of the Administrative Record (located at the Library) which contains all documents used by EPA in making a final determination of the best cleanup/treatment for the Site. Once the ROD has been approved, EPA will begin negotiations with the Potentially Responsible Parties (PRPs) to allow them the opportunity to design, implement and absorb all costs of the remedy determined in the ROD in accordance with EPA guidance and protocol. If negotiations do not result in a settlement, EPA may conduct the remedial activity using Superfund Trust monies, and sue for reimbursement of its costs with the assistance of the Department of Justice. Or EPA may issue a unilateral administrative order or directly file suit to force the PRPs to conduct the remedial activity. Once an agreement has been reached, the design of the selected remedy will be developed and implementation of the remedy can begin. The preceding actions are the standard procedures utilized during the Superfund process.

As part of the Superfund program, EPA provides affected communities by a Superfund site with the opportunity to apply for a Technical Assistance Grant (TAG). This grant of up to $50,000 enables the group to hire a technical advisor or consultant to assist them in interpreting or commenting on site findings and proposed remedial action plans.

For more information concerning this grant program, please contact:

Ms. Rosemary Patton, Coordinator
NC Technical Assistance Grants
Waste Management Division
U.S.E.P.A., Region 4
345 Courtland Street, NE
Atlanta, GA 30365
(404) 347-2234

<Figure>

FOR MORE INFORMATION ABOUT SITE ACTIVITIES, PLEASE CONTACT:

Mr. John Bornholm, Remedial Project Manager or
Ms. Diane Barrett, NC Community Relations Coordinator
North Superfund Remedial Branch
Waste Management Division
U.S. Environmental Protection Agency, Region IV
345 Courtland Street, NE
Atlanta, Ga 30365
Toll Free No.: 1-800-435-9233

GLOSSARY OF TERMS USED IN THIS FACT SHEET

Aquifer: An underground geological formation, or group of formations, containing usable amounts of groundwater that can supply wells and springs.

Administrative Record: A flee which is maintained and contains all information used by the lead agency to make its decision on the selection of a method to be utilized to clean up/treat contamination at a Superfund site. This file is held in the information repository for public review.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state requirements that a selected remedy must attain. These requirements may vary among sites and various alternatives.

Baseline Risk Assessment: A means of estimating the amount of damage a Superfund site could cause to human health and the environment. Objectives of a risk assessment are to: help determine the need for action; help determine the levels of chemicals that can remain on the site after cleanup and still protect health and the environment; and provide a basis for comparing different cleanup methods.

Carcinogen: Any substance that can cause or contribute to the production of cancer; cancer-producing.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Acts created a special tax paid by producers of various chemicals and oil products that goes into a Trust Fund, commonly known as Superfund. These Acts give EPA the authority to investigate and clean up abandoned or uncontrolled hazardous waste sites utilizing money from the Superfund Trust or by taking legal action to force parties responsible for the contamination to pay for and clean up the site.

Groundwater: Water found beneath the earth's surface that fills pores between materials such as sand, soil, or gravel (usually in aquifers) which is often used for supplying wells and springs. Because groundwater is a major source of drinking water there is growing concern over areas where agricultural and industrial pollutants or substances are getting into groundwater.

Hazardous Ranking System (HRS): The principle screening tool used by EPA to evaluate risks to public health and the environment associated with hazardous waste sites. The HRS calculates a score based on the potential of hazardous substances spreading from the site through the air, surface water, or groundwater and on other factors such as nearby population. This score is the primary factor in deciding if the site should be on the National Priorities List and, if so, what ranking it should have compared to other sites on the list.

Information Repository: A file containing accurate up-to-date information, technical reports, reference documents, information about the Technical Assistance Grant, and any other materials pertinent to the site. This file is usually located in a public building such as a library, city hall or school, that is accessible for local residents.

Maximum Contaminant Levels (MCLs): The maximum permissible level of a contaminant in water delivered to any user of a public water system. MCLs are enforceable standards.

National Pollutant Discharge Elimination System (NPDES): A provision of the Clean Water Act which prohibits the discharge of pollutants into waters of the linked States unless a special permit is issued by EPA, a state or (where delegated) a tribal government on an Indian reservation allowing a controlled discharge of liquid after it has undergone treatment.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. A site must be on the NPL to receive money from the Trust Fund for remedial action. The list is based primarily on the score a site receives from the Hazard Ranking System (HRS). EPA is required to update the NPL at least once a year.

Potentially Responsible Parties (PRPs): Any individual or company - including owners, operators, transporters, or generators - potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, EPA requires PRPS, through administrative and legal actions, to clean up hazardous waste sites PRPs have contaminated.

Remedial Investigation/Feasibility Study (RI/FS): The Remedial Investigation is an in-depth, extensive sampling and analytical study to gather data necessary to determine the nature and extent of contamination at a Superfund site; to establish criteria for cleaning up the she; a description and analysis of the potential cleanup alternatives for remedial actions; and support the technical and cost analyses of the alternatives. The Feasibility study also usually recommends selection of a cost-effective alternative.

Record of Decision (ROD): A public document that announces and explains which method has been selected by the Agency to be used at a Superfund site to clean up the contamination.

Responsiveness Summary: A summary of oral and written public comments received by EPA during a public comment period and EPA's responses to those comments. The responsiveness summary is a key part of the Record of Decision.

Semi-Volatile Organic Compounds (SVOCs): Carbon-containing chemical compounds that, at a relatively low temperature, fluctuate between a vapor state (a gas) and a liquid state.

Volatile Organic Compounds (VOCS): Any organic compound that evaporates readily into the air at room temperature.

Water Table: The level below which the soil or rock is saturated with water, sometimes referred to as the upper surface f the saturated zone. The level of groundwater.

MAILING LIST ADDITIONS

If you are not already on our mailing list and would like to be placed on the list to receive future information on the National Starch & Chemical Company Superfund Site, please complete this form and return to Diane Barrett, Community Relations Coordinator at the above address:

NAME:

ADDRESS:

CITY, STATE, ZIP CODE:

PHONE NUMBER:

APPENDIX C

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY FOR THE PROPOSED REMEDIAL ACTION
FOR OPERABLE UNIT #3
NATIONAL STARCH & CHEMICAL COMPANY SUPERFUND SITE
SALISBURY, ROWAN COUNTY, NORTH CAROLINA

Based on Public Comment Period
July 19 through September 16, 1993
Which Includes August 3, 1993 Public Meeting Held In
Agricultural Extension Center, Salisbury, North Carolina

Prepared by:
U.S. Environmental Protection Agency, Region IV
September 1993

RESPONSIVENESS SUMMARY
OPERABLE UNIT #3 PROPOSED PLAN
NATIONAL STARCH & CHEMICAL COMPANY SUPERFUND SITE

TABLE OF CONTENTS

1.0 OVERVIEW

The development of this Responsiveness Summary is in accordance to the requirement set forth in 40 CFR 300.430(f)(3)(i)(F). This community relations Responsiveness Summary is divided into the following sections:

Section 2.0 BACKGROUND

This section discusses the Environmental Protection Agency's preferred alternative for remedial action, provides a brief history of community interest, and highlights the concerns raised during the remedial planning for Operable Unit #3 (OU #3 or OU3) at the National Starch & Chemical Company (NSCC or NSC) Superfund Site.

Section 3.0 SUMMARY OF MAJOR ISSUES/CONCERNS/QUESTIONS/STATEMENTS VOICED DURING PROPOSED PLAN PUBLIC MEETING

This section provides a summary of issues/concerns and questions/comments voiced by the local community and responded to by the Agency during the Proposed Plan public meeting. "Local community" may include local homeowners, businesses, the municipality, and not infrequently, potentially responsible parties.

Section 4.0 SUMMARY OF MAJOR ISSUES/CONCERNS/QUESTIONS/STATEMENTS VOICED DURING PUBLIC COMMENT PERIOD

This section provides a comprehensive response to all significant written comments received by the Agency and is comprised primarily of the specific legal and technical questions raised during the public comment period.

2.0 BACKGROUND

The Environmental Protection Agency (EPA) conveyed its preferred remedial alternative for OU #3 NSCC Superfund Site, located in Salisbury, North Carolina in the Proposed Plan Fact Sheet mailed to the public on July 15, 1993, and through an ad in The Salisbury Post and The Charlotte Observer newspapers. The ads were published in the July 19, 1993 edition of these two newspapers. A press release reminding the public of the forthcoming meeting was issued on July 30, 1993. The public meeting was held on August 3, 1993 at the Agricultural Extension Center in Salisbury, North Carolina. The purpose of the meeting was to present and discuss the findings of the OU #3 Remedial Investigation/Feasibility Study (RI/FS), to apprise meeting participants of EPA's preferred remedial alternative for OU #3, to respond to any questions or address any concerns expressed during the public meeting, and to take their comments and make them a part of the official record. A copy of the transcript from the August 3 public meeting was placed in the Information Repository for public reading. The Proposed Plan Fact Sheet, the newspaper ad, and the press release all informed the public that the 30-day public comment period would run from July 19 to August 17, 1993. However, a request was made for a 30-day extension to the public comment period. Consequently, the public comment period was extended to September 16, 1993.

No remedial alternative was presented for soils as this environmental medium will be addressed in the forthcoming Operable Unit #4.

The alternative presented for addressing the contaminated groundwater included Alternatives GWP3B/GWL3B and GWP4B/GWL4B: This alternative permanently removes the contaminants in the groundwater through groundwater extraction and on-site treatment through an air stripper with controls on air emissions. The treated groundwater will be discharged into the City of

Salisbury's sewer system. The following activities are involved in this alternative:

Contaminated groundwater will be extracted from within and at the periphery of the plumes emanating from the Area 2 and the treatment lagoon area via extraction wells and piped to an on-site, above-ground treatment process;

Treatment will consist of air stripping to achieve concentrations to meet discharge requirements set forth by the City of Salisbury wastewater treatment system;

Long-term monitoring of the underlying aquifer; and Implementation of a deed restriction on the NSCC property as an institutional control.

The alternative presented for addressing the contamination detected in the surface water and sediment of the Northeast Tributary was SW/SE-2. This alternative requires long-term monitoring of the stream as the proposed groundwater remediation system will reduce and eventually eliminate the contamination discharging into the stream along with the groundwater.

The Risk Assessment indicates that neither the soils nor groundwater pose an unacceptable risk to either human health or the environment under present conditions; however, these contaminated environmental media could pose as an unacceptable future risk to both human health or the environment. In addition, the remediation of the groundwater is warranted as the levels of 1,2-dichloroethane and a number of other chemicals are above applicable or relevant and appropriate requirements (ARARs) established for these contaminants in the groundwater. For these contaminants, the cleanup goals selected were Safe Drinking Water Maximum Concentration Levels, State of North Carolina groundwater quality standards, and risk based concentrations.

Community interest and concern about the NSCC Site has fluctuated from moderate to high over the past two decades. Awareness of and concern about the NSCC "Plant", not the Superfund related hazardous wastes, were very high in the communities which are adjacent to and nearby the "Plant". NSCC received considerable news media attention when it's Lumber Street Plant, which is also located in Salisbury, North Carolina, experienced an explosion which destroyed a section of the plant. In 1984, at the NSCC Cedar Springs Road Plant where the Superfund Site is located, a production process reportedly boiled over releasing a vapor cloud containing acetic acid. The vapor cloud reportedly injured vegetation for up to 1.5 miles from the plant.

A 1985 newspaper article indicated there were mixed feelings in the communities surrounding the plant. Some of the residents believe that NSCC is a responsible company with an excellent record and that NSCC will work with EPA and cleanup the dump. Other residents were concerned about the effects on their health and believe their community has borne the brunt of living near to NSCC. As stated above, the community has maintained a high level of awareness and concern regarding NSCC as a result of the incidents reported in the media.

The following provides details on the accumulative community relations efforts conducted by the Agency. A Community Relations Plan identifying a positive public outreach strategy was completed in September 1986. As part of this initiative, Information Repositories including the Administrative Record, were established at the Rowan County Public Library and in EPA, Region IV Information Center in Atlanta, Georgia to house the Administrative record for the Site. The Information Repository and Administrative Record are available for public review during normal working hours.

Fact sheets and public meetings were the primary vehicles for disseminating information to the public. EPA sponsored a number of public meetings and released several fact sheets to keep the public apprised of current activities, to help the community understand the Superfund program and the public's role in the process, and to share information regarding the direction and technical objectives of data collection activities at the Site. Only a few individuals from the community attended the Proposed Plan public meeting. In addition to these individuals, one representative from the news media, representatives from NSCC, and representatives from various government agencies also attended the meeting.

3.0 SUMMARY OF MAJOR ISSUES/CONCERNS/QUESTIONS/STATEMENTS VOICED DURING PROPOSED PLAN PUBLIC MEETING AND RESPONSES

This section summarizes the major issues and concerns expressed during the Proposed Plan public meeting. Only four questions were asked during the public meeting. They related to:

- Why was soil remediation alternatives left out of the Proposed Plan?
- Area of soil contamination?
- In what direction is the contamination migrating and has the contamination migrated off the NSCC property?

A recount of the questions summarized above and the Agency's response can be found on pages 32-36 of the transcript of the Proposed Plan public meeting (Attachment A).

Summarized below are significant questions asked during the Proposed Plan public meeting:

3.1 SOIL REMEDIATION ALTERNATIVES

Q: What's wrong with the soil that you have to go back to the operation?

A: It's not what's wrong. NSCC needs to perform a more thorough evaluation of the soil alternatives.

3.2 AREA OF SOIL CONTAMINATION

Q: Where's the soil now?

A: An overhead was used to show the extent of soil contamination.

3.3 MIGRATION OF CONTAMINATION

Q: Has any of the contamination left the soil yet? Left the property?

A: To the best of our knowledge, no.

Q: Something in the paper about it traveling north; is that true?

A: Its tending to follow the stream which flow in a northerly direction.

4.0 SUMMARY OF MAJOR ISSUES/CONCERNS/QUESTIONS/STATEMENTS VOICED DURING PUBLIC COMMENT PERIOD

This section summarizes the major issues and concerns expressed during the Proposed Plan public comment period. The major issues and concerns on the proposed remedy for OU #3 NSCC Site can be grouped into five areas:

- Discharge into the City of Salisbury sewer system;

- Establishment of a Fourth Operable Unit;
- Establishment of a Point of Compliance with Enforceable Institutional Controls;
- Establishment of a Site Cleanup Level for 1,2-Dichloroethane; and
- Selection of the Most Cost Effective Remedial Alternative.

Below is each written comment received and the Agency's corresponding response in italicized print. The comments below have been transcribed verbatim from the written set of comments the Agency received.

4.1 CONCERN ABOUT DISCHARGING INTO THE CITY OF SALISBURY SEWER SYSTEM

COMMENT #1: This industrial user is subject to categorical OCPSF organics limits, and is usually in compliance with our local limits for those compounds. However, the application of supplementary limits to the discharge - fume toxicity, explosivity, and human health criteria - could result in some limits being so restrictive that this discharger may be unable to consistently meet those limits. If this occurs, the potential exists that the remediation project could be halted until the system is redesigned to meet the more stringent limits.

The City requests that the EPA Superfund Branch work and communicate with the NPDES Permit Branch in an effort to develop and implement limits based on more practical, alternative ways of assuring both worker safety and collection system integrity. We feel that the existing methods may produce limits which are unrealistic when compared to OCPSF limits or local limits derived by traditional headworks methods. We request your assistance in resolving this compliance issue.

RESPONSE: Currently, IT Corporation which is NSCC's contractor, does not believe it will be necessary to revise NSCC's existing discharge permit. However, in the event after closer examination of all the data, it becomes apparent that the discharge permit to the City of Salisbury sewer system will need to be revised due to the additional loading created by the groundwater extraction system for OU #3, then all entities involved, the Agency, North Carolina Department of Environment, Health & Natural Resources (NCDEHNR), the City of Salisbury, the potentially responsible party (PRP), and the PRP's contractor will need to work together to develop and implement limits based on practical, alternative ways of assuring both worker safety and collection system integrity. A determination on whether or not the existing discharge permit will need to be revised cannot be made until the Remedial Design stage at which time the actual loading rates and volumes can be calculated.

4.2 ESTABLISHMENT OF A FOURTH OPERABLE UNIT

COMMENT #2: For the reasons expressed in the enclosed comments of IT, we do not believe that it is necessary to establish a Fourth Operable Unit. NSC has agreed to perform the DNAPL test suggested by EPA and the State. We are prepared to perform this test immediately following EPA's approval so that the results will be available prior to issuance of the ROD. Thus, if the tests do not show the presence of DNAPLs, we do not think a Fourth Operable Unit to address soils should be required.

At a minimum, we think it is premature to establish a Fourth Operable Unit unless and until such time as continued groundwater monitoring results indicate that concentrations of contaminants do not significantly decrease. We suggest that the ROD be written so as to require a Fourth Operable Unit at a later date, only if necessary, following the analyses of sufficient groundwater monitoring results that would allow a determination of the effectiveness of a no action soil alternative.

RESPONSE: The need for a fourth operable unit was a mutually agreed upon decision between the Agency and NCDEHNR. The decision was based upon the fact that the June 21, 1993 FS report did not provide sufficient supporting and defendable technical rationale for the elimination of soil remediation technologies that could permanently remove the residual contamination from the soil. Therefore, OU #4 FS will need to more thoroughly evaluate soil remediation technologies providing sufficient rationale for the elimination and/or retention of appropriate technologies that can address the soil contamination at the Site.

Another concern which was highlighted during the review of the draft Proposed Plan focused on the potential presence of either a free-phase or residual dense non-aqueous phase liquid (DNAPL) in the soil in Area 2. The primary contaminant at the NSCC site is 1,2-dichloroethane (1,2-DCA) which is a chemical that can exist as a DNAPL. The presence of a DNAPL in either the soils or aquifer can control the ultimate success or failure of remediation at a hazardous waste site. The testing procedures and findings of the hydrophobic dye test conducted on September 22-23, 1993 shall be incorporated in the OU #4 FS document. Currently, the Agency does not foresee the need for any additional field work to be conducted as part of OU #4; hence, the June 2, 1993 RI report should suffice as the OU #4 RI report.

COMMENT #3: We disagree with the EPA for the need of another Operable Unit. Based on the investigative data that has been collected the source of contamination of the subsurface soils is well defined. In fact, the EPA has stated in the Proposed Plan that "The OU3 soil investigation has generated ample information to characterize the contamination, determine the source, and define the extent of contamination in the vadose soil zone."

The EPA and the NCDEHNR have both expressed their concerns about the presence of dense nonaqueous phase liquid (DNAPL), which they have used as the basis for the establishment of OU4. The agencies want the OU3 FS expanded to include more active remedial actions for the soil because they suspect the DNAPL may be present in the soil and if the DNAPL continues to release from the soil to the groundwater the groundwater remediation will not succeed in cleaning up the aquifer. The data that has been collected to date does not indicate that DNAPLs are present, but direct testing has not been performed to refute their concern.

The NCDEHNR has recommended a field screening test using hydrophobic dye to make the determination of the presence or absence of DNAPLS, which NSCC has agreed to perform. The testing procedure along with the proposed borehole location is provided as Attachment A. (This attachment has not been incorporated into the Responsiveness Summary.) We feel that if the test results show an absence of DNAPL there truly is no need for another operable unit. We continue to recommend long-term monitoring of the groundwater to determine if no action is sufficient for the subsurface soils. If increased concentrations of contaminants or no substantial decrease in concentrations of contaminants are noted after 5 years of active groundwater remediation then other remedial options may have to be considered.

RESPONSE: As denoted in the Response to Comment #2 above, it is the lack of supporting technical rationale in the June 21, 1993 FS report for the elimination/retention of the soil remediation technologies that is actually driving the need for revising this document in OU #4. In other words, the OU #3 FS Report failed to meet the requirement set forth in Section 121 CERCLA. This section states, EPA shall "conduct an assessment of...alternative treatment technologies, that in whole, or in part will result in a permanent...significantly decrease in the toxicity, mobility...". The FS report failed to discuss alternative treatment technologies for soil. The FS report discussed only institutional controls and long-term monitoring.

If a DNAPL is found to exist on-site, the Agency has found through experience that it is more advantageous to remove the DNAPL directly rather than rely on a pump and treat technology to remove the DNAPL. If necessary, the OU #4 FS report will need to address this issue.

4.3 ESTABLISHMENT OF A POINT OF COMPLIANCE WITH ENFORCEABLE INSTITUTIONAL CONTROLS

COMMENT #4: EPA should establish a point of compliance for remediation of the contaminated plume that is, at a minimum, at the plume periphery rather than throughout the plume. That the NCP permits a remedy to incorporate a point of compliance that is a distance away from the source of groundwater contamination is not disputed by EPA. This issue was raised recently in a lawsuit brought by various states against EPA challenging EPA's use of the NCP in CERCLA. Ohio v. EPA, 39 ERC 2065, US Ct App, DC (1993). There, the Plaintiff states argued that in the preamble to the NCP EPA acknowledges that, while "remediation levels should generally be attained throughout the contaminated plume, or at and beyond the edge of the waste management area...an alternative point of compliance may also be protective of public health and the environment under site-specific circumstances." (underlines added) 40 C.F.R. 300.430(f)(5)(iii)(A). EPA did not challenge the states' interpretation of the NCP in this regard. Rather, EPA's response was that "...alternatives must in any case be protective of public health and the environment." Ohio v. EPA, supra at p. 2080. It is thus clear from the language of the NCP, and from EPA's interpretation of the NCP in the Ohio case, that it is permissible to set a point of compliance at the property boundary, the plume periphery, or any other alternate point so long as it is protective of public health and the environment.

The NCP threshold criteria of overall protection of public health and the environment is met at this site by setting such alternative point of compliance at the plume periphery, especially when combined with institutional controls. NSC is certainly agreeable to having a deed restriction recorded against the site indicating that the plume of contaminated groundwater is not suitable for drinking and prohibiting such use in perpetuity. Such deed restriction would run with the land and would thus legally prevent drinking water wells from being established in or near the plume. Moreover, NSC is willing to support the adoption by the City of Salisbury of an ordinance that would also prohibit such use of the groundwater unless it is demonstrated to meet drinking water standards. Such undertakings on the part of NSC could be incorporated into an enforceable Consent Decree in which NSC would agree to notify EPA and the State of North Carolina in the event it ever sold the site to a third party. Stipulated penalties could also be incorporated into the Consent Decree to ensure the enforceability of such institutional controls.

It is doubtful that a site cleanup level of 5 ppb (and certainly of 1 ppb) for 1,2-dichloroethane ("DCA") throughout the entire plume could ever be met. Establishing an alternate point of compliance of the plume periphery, along with the institutional controls mentioned above, or other institutional controls which NSC would be willing to consider, meets the threshold NCP requirement of overall protection of the environment and is consistent with EPA's interpretation of the NCP as articulated most recently in Ohio v. EPA, supra.

RESPONSE: 40 CFR 300.430(a)(1)(iii)(F) states "EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site. When restoration of ground water to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water and evaluate further risk reduction." And in accordance to Section 5.2.1 of EPA's Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites (EPA/540/G-88/003), "The area of attainment defines the area over which cleanup levels will be achieved in the ground water. It encompasses the area outside the boundary of any waste remaining in place and up to the boundary of the contaminant plume." Furthermore, it states that "...if the source is removed, the entire plume is within the area of attainment." Based on the above assertions, the Agency elected that the entire plume be the point of compliance.

COMMENT #5 The proposed plan did not discuss a compliance point nor do the agencies accept the concept of a compliance point for CERCLA, when it is commonly used under RCRA. However, the agencies have no problem associating various laws, acts, regulations to determine cleanup standards (i.e. ARARS). The final rule, 40 CFR 300.430 (f)(5)(iii)(A), provides the following statement "performance shall be measured at appropriate locations in the groundwater...". The groundwater plume is considered the waste management area, therefore the point of compliance should be at the edge of the plume.

The groundwater plume boundary has been well defined as depicted in figures in the RI/FS documents. The area of groundwater contamination is well within the property boundaries, which offers the agency with a large buffer zone between the compliance point and the nearest receptors. An integral part of the establishment of compliance points is the implementation of institutional controls. Institutional controls are required at this site in order to prevent future human exposure to contaminants remaining within the waste management area (i.e. groundwater plume upgradient of the compliance points).

The agencies have expressed concern over their inability to enforce institutional controls. There are many options available to the agencies such as: deed restrictions, local ordinances, fencing, etc. The enforcement terms of for these controls can be identified as part of a consent decree, administrative order, contract, etc. National Starch should make a recommendation to the agency.

RESPONSE: The Agency maintains that the point of compliance will be throughout the entire plume of contamination. Refer to the response for Comment #4 for the supporting rationale.

4.4 ESTABLISHMENT OF A SITE CLEANUP LEVEL FOR 1,2-DICHLOROETHANE

COMMENT #6: As discussed in the enclosed comments of IT, the site cleanup level for DCA should be set at 5 ppb (at the point of compliance, as discussed above) which is the federal primary drinking water standard. Such level satisfies the NCP criteria of overall protection of public health and the environment. The State of North Carolina drinking water standard of .38 ppb, while relevant, is not appropriate based on problems with the accuracy of detecting concentrations of DCA at that level and it is not applicable to the contaminated groundwater plume here since such groundwater is not the source of drinking water supplies.

EPA has proposed a level of 1 ppb for Operable Unit Three in recognition of the problem of accurately detecting DCA at levels of .38 ppb. However, EPA has previously determined that the practical quantitative limit ("PQL") (defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy) is 5 ppb for all volatile organic compounds except vinyl chloride. Federal Register, Vol. 52, No. 130, July 6, 1987. We do not believe there is any basis for establishing a level of 1 ppb for DCA as an ARAR at this site. To the extent that any level other than the federal drinking water standard is deemed by EPA to be an ARAR, we believe such ARAR should be waived and we accordingly request such a waiver. We do not believe that a level of 1 ppb of DCA can be demonstrated by EPA to be applicable to the conditions at this site, nor is it technically achievable since it is below the PQL as determined by EPA.

RESPONSE: 40 CFR 300.400(g)(4) states, "Only those state standards that are promulgated, are identified by the State in a timely manner, and are more stringent than federal requirements may be applicable or relevant and appropriate". The state groundwater quality standard for 1,2-DCA is 0.38 g/l as specified in North Carolina Administrative Code (NCAC) 15-2L.0202(g). However, NCAC 15-2L.0202(b)(1) allows the state groundwater quality standard to be raised to the detectable concentration. Consequently, the Agency raised the groundwater performance standard for 1,2-DCA from 0.38 g/l to 1.0 g/l as 1.0 g/l is the detection limit for 1,2-DCA under the drinking water analytical protocols, EPA method 524.2. Based on the Superfund Analytical Methods for Low Concentrations Water for Organic Analysis for the Contract Laboratiry Program, dated June 1991, the quantitation limit for 1,2-DCA is set at 1 g/l.

40 CFR 300.430(f)(1)(ii)(C) provides the grounds for invoking a waiver. Based on the Agency's evaluation on the request for a waiver to the State's groundwater quality standard (NCAC 15-2L.0202), the Agency concluded that the request does not satisfy any of the specified grounds for invoking a waiver.

COMMENT #7: The federal MCL for 1,2-DCA is 5 ppb. The NCDEHNR groundwater standard for 1,2-DCA is 0.38 ppb. IT has presented arguments in the past against using the state standard based on the impracticability of accurately measuring the concentration of 1,2-DCA at that level. Based on this argument, EPA has now proposed a cleanup standard of 1.0 ppb. However, this is in conflict with the evaluation that was conducted by the EPA for the establishment of the MCL.

For the establishment of MCLs the EPA assesses a range of factors such as: the availability and performance of Best Available Technology (BAT), the cost of these technologies, the availability and reliability of analytical results, and the resulting health risk (for carcinogens 10-4 to 10-6 is the acceptable range). As part of the assessment for proposing the MCL for 1,2-DCA, the EPA determined that "the costs associated with the additional removals, i.e., from 0.005 mg/l to 0.001 mg/l, are not warranted", therefore, the MCL was established at 5 ppb (Federal Register, Vol. 52, No. 130, July 6, 1987).

The EPA proposed cleanup standards are established for drinking water supplies. National Starch plans to implement deed restrictions and possibly have the City of Salisbury establish an ordinance so that the installation of drinking water wells within the plume area will not be allowed. Based on the arguments presented, we feel that the cleanup level for 1,2-DCA should be 5 ppb.

RESPONSE: Although the argument set forth in this comment is straightforward, it does not address the ultimate reason why the Agency selected a performance (clean-up) standard of 1 microgram per liter (g/l) or 1 part per billion (ppb) for 1,2-DCA. To have selected anything else (i.e., the maximum contaminant level (MCL) for 1,2-DCA) as requested by this comment would have resulted in this Record of Decision (ROD) in being out of compliance with the law. 40 CFR 300.400(g)(4) states, "Only those state standards that are promulgated, are identified by the State in a timely manner, and are more stringent than federal requirements may be applicable or relevant and appropriate". The state groundwater quality standard for 1,2-DCA is 0.38 g/l as specified in NCAC 15-2L.0202(g). However, NCAC 15-2L.0202(b)(1) allows the state groundwater quality standard to be raised to the detectable concentration. Consequently, the Agency raised the groundwater performance standard for 1,2-DCA from 0.38 g/l to 1.0 g/l as 1.0 g/l is the detection limit for 1,2-DCA under the drinking water analytical protocols, EPA method 524.2.

4.4 SELECTION OF THE MOST COST EFFECTIVE REMEDIAL ALTERNATIVE

COMMENT #8: For the reasons discussed by IT, we believe that vapor-phase carbon adsorption should be selected by EPA as the preferred remedial alternative based on cost-effectiveness.

RESPONSE: Both the vapor-phase carbon adsorption technology and the fume incinerator technology achieve the same degree of protection and treatment of the emissions from the air stripper. As directed by 40 CFR 300.430(f)(1)(ii)(D), the Agency should select the most cost effective alternative. Based on the information provided in Comment #9, the Agency concurs with the request stated in this comment and has selected vapor-carbon adsorption as the choice of treating the emission generated by the air stripper.

COMMENT #9: Upon further review of the cost estimates provided in the FS it became apparent that the O&M costs for vapor-phase carbon adsorption did not take into account the reduction in groundwater concentrations over time. Using the results of the contaminant fate and transport model (FS Appendix D) the depletion rates for 1,2-DCA were estimated. Using the depletion rates and starting with an assumed average concentration of 55,000 ppb of 1,2-DCA in groundwater, the estimated vapor-phase carbon usage was calculated. The cost was then estimated based on the total amount of carbon required for 15 years of treatment. Therefore, the revised estimate for Alterative GWL3A Lagoon Area Groundwater (Extraction, Air Stripping, Vapor-Phase Carbon) is $2,612,000 and the revised estimate for Alterative GWP3A Plant Area

Groundwater (Extraction, Air Stripping, Vapor-Phase Carbon) is $1,814,000. The combined total is approximately $480,000 less than was reported in the FS cost estimate for the same Alternatives and is approximately $107,000 less than the combined total for the same alternatives using fume incineration. Therefore, we recommend that the agency select vapor-phase carbon adsorption over fume incineration.

RESPONSE: The Agency appreciates the above information and as specified in the response to Comment #8, concurs with the request to change the treatment technology for the emissions from the air stripper from fume incinerator to vapor-phase carbon adsorption.

ATTACHMENT A

TRANSCRIPT OF PUBLIC MEETING

NATIONAL STARCH AND CHEMICAL COMPANY
SUPERFUND SITE

GROUNDWATER REMEDIATION FOR
OPERABLE UNIT NUMBER 3

7:00 P.M.
August 3, 1993
Salisbury, North Carolina

PROPOSED PLAN PUBLIC MEETING

A P P E A R A N C E S

Ms. Diane Barrett
Community Relations Coordinator
United States Environmental Protection Agency
Region IV
345 Courtland Street, Northeast
Atlanta, Georgia 30365

Mr. Jon Bornholm
Remedial Project Manager
Superfund Remedial Branch

Mr. Winston Smith
Groundwater Expert

I N D E X

This is the proposed plan public meeting for the National Starch and Chemical Company Superfund Site in Salisbury, North Carolina, conducted before Shannon S. McGilberry, Certified Verbatim Reporter and Notary Public, at the Agricultural Extension Center, 2727 Old Concord Road, Salisbury, North Carolina, on August 3, 1993, beginning at 7:00 P. M.

MS. BARRETT: Well, I want to welcome you tonight. My name is Diane Barrett; I'm the Community Relations Coordinator for the State of North Carolina for our Superfund sites in this State. Tonight's meeting is to present to the public the proposed alternatives for treating groundwater at this site, at the National Starch and Chemical Company Superfund Site. I'd like to introduce to you our other people from Atlanta. Mr. Jon Bornholm, Jon please stand. He is the remedial project manager for this site and then Mr. Winston Smith, he is our groundwater expert. I hope each of you have availed yourselves of the literature out front as you came in as well as signing up. This literature will give you a lot of information about what we're talking about tonight, so that will help y'all make a well informed decision on what we're doing here. The public comment period for this particular proposed plan began on July the 19th and will end at midnight August the 17th. This is also a required meeting by our circle of law and we have a court reporter here and she will be taking the transcript from this meeting. So when it comes to our public comment period, if you would please stand and give your name so that she can get it for the record, we would appreciate it.

I wanted to give you just a brief run down of the community relations activities that have happened so far at this site. First of all, let me ask how many of you have been to one of these meetings before regarding this particular site and are familiar with Superfund? Are y'all familiar with Superfund? Okay.

First of all, at any site after it's first discovered, and this site was investigated and the proposed in the national priorities list and then finalized in October of 1989, and the national priorities list made this site eligible to be funded for remedial design work through our Superfund money. The Superfund money is a tax that is levied against chemical and oil producing companies and the monies there are put in a fund, and as the Superfund work progresses and we get into the remedial design and action stages of a process, the monies are used to conduct the activities if there are not viable people to pay for the work.

When we first began, after the site was first listed on the national priorities list, the agency conducted interviews here in the community to find out what the community concerns were and then we prepared what we call our -- a community relations plan that addressed the concerns of the communities and how we would endeavor to keep them informed. Now, we do that through such things as fact sheets, news articles, telephone calls, we have a one-eight-hundred number, for your convenience, to call us. It is listed in the fact sheet. We also have set up a repository which houses all of the documents that have been developed that give us reports on making our decisions on how to conduct the remedial design activities for the site and making a selection of which alternatives to use. This repository is in the Rowan County Public Library in downtown Salisbury.

When we first started our interviews, a mailing list was also developed at the time, and then from each meeting thereafter, the names of those who attended have been added to our mailing list so that we can make sure that those interested do receive information.

On September the 4th, 1985, the first meeting was conducted here and that there were about sixty people, I think, that attended that meeting, and that was just the beginning of meetings. At that time, too, the remedial investigation began and that identifies the nature and extent of the contamination. This particular meeting covers groundwater at the site. As part of the remedial investigation, a risk assessment is conducted and this evaluates and identifies any risks posed by specific chemicals. There are six fact sheets out there in the entrance way covering various contaminants of concern. The major contaminant of concern, though, is what we call 1,2-DCA, which is Dichloroethane. This is a major contaminant of concern that we're addressing. After remedial investigation is conducted, that sometimes can last a year to two years because extensive sampling and analytical work is done, and sometimes we may have to go out a second time to gather more data if we feel like we have not been able to get enough at the time. Then the feasibility study begins. This goes through various alternatives that can be utilized to treat the contaminants that are at the site, and this also supports all of our responses to the contaminants and the concerns that are listed in our investigation. After the feasibility study has been completed, we are at the point where we are now, with the proposed plan fact sheet and our public meeting. These meetings, or this period, carries a thirty-day public comment period and if requested, it can be extended another thirty days. Once this is completed, when the comment period ends, a remedy will be selected. That remedy is selected based on all the documentation that we have received, plus all public comments that we get from the public. A record of decision is recorded and announcing the selection that has been made for treatment of the contamination at the site.

An announcement will appear in an area newspaper informing the public of the selection as well as a regular decision fact sheet will be prepared giving more detail into the alternative that was selected so that it gives the public a better understanding of what's going on.

Hopefully tonight, too, through Jon's explanation of everything that you'll have a good understanding of what we're proposing, but we've got some good slides.

This is the Superfund process. Any time throughout that process community relations are conducted and down below is a list of the various activities that we undertake in keeping our public informed. There is a technical assistance branch that is offered at each Superfund site for the affected community, and that technical assistance branch allows the community to organize into a nonprofit unit and then to contract to have a consultant come in and help them understand and decipher all the technical explanations and help them have a more active part in the decision making process regarding the site. Right now, looking at this chart, we are at step five, the public comment period, and we really request your comments. This is your site; you live here, we don't, and we need to know what really affects you and we would appreciate your comments. I want to turn the meeting over now to Jon Bornholm who will go through the alternatives that have been proposed in the fact sheet. Thank you for your attention.

MR. BORNHOLM: Thanks, Diane. Just a brief word about myself. I've been a Remedial Project Manager for the Superfund program since 1984. I conducted the 1988 public meeting here in Salisbury on the first operable unit in lieu of my colleague who was on maternity leave. Hopefully everybody picked up a handout that looks like this; it's about twenty pages long. This is basically all the overheads I'll be going through tonight. Some of them I'll read through quickly because you have a copy of them here and you can look at them more in detail at your own leisure. But first of all, what I'd like to do first is just go through the history of the site just so that everybody is brought up to date as to where we're at today.

The first figure that shows is the approximate location of the site in Salisbury, and moving into the background of the site. It was first owned by Proctor Chemical which was then been acquired by the present owner, National Starch & Chemical Company, who continue to operate the plant today. It is an active facility. As Diane alluded to before, the site was proposed on the National Priorities List in 1985. It was reproposed in 1988 and was finalized on the list in 1989. Sites that score below a hazardous ranking score of 28.5 are not added to the list, the National Priorities List. Everything above 28.5 is eligible to be placed on the National Priorities List and the individual scores for the ranking process basically the surface water pathway and air pathway at the time of assessment scored zero and the groundwater pathway was what scored and resulted in the site being put on the National Priorities List.

The first operable unit began in 1986 with the National Starch and Chemical Company signing a administrative order on consent with the Agency, basically agreeing to do the work that we established for them to do and the rest of the information pertains to the work done as part of operable unit number 1. The remedial investigation looked at the air, the surface water, the ground water, as well as the soils. The proposed plan fact sheet was distributed to the public and we held our public meeting. Back then the public comment period was only three weeks long. Since that time the Superfund law has been revised to a four-week period or thirty days with a potential extension of an additional thirty days at the request of the public. That record of decision was signed on September 30th, 1988 for operable unit one. And I'll -- there's another figure that's kind of details where all these operable units are on the site.

Operable unit two was initiated back in '89. Basically what the first record of decision did was it identified the -- the information said that the groundwater and soil was contaminated, but the Agency wasn't comfortable with the information with respect to the soils contaminated, so the Agency directed the potential responsible parties to go back and do an additional investigation which on operable unit two consists of. Again, we had a proposed plan fact sheet that was issued to the public. We had our public meeting and then the record decision was signed in September of 1990. As an operable unit number -- as in the record decision for operable unit one, this record decision for operable unit two also required additional work by the potentially responsible parties and this became operable unit three.

And basically where we're at right now with regard to operable unit three, the work was basically started in 1991 with the remedial investigation being concluded in March of this year, at least the field work was. The proposed plan was distributed on July. Tonight is the public meeting for that proposed plan and then the public commentary is – it began, as Diane said, on July 19th.

Operable unit three consists of two areas. The plant area, which is the active facility itself, which consists of area number 2, which includes the reactor room, the tank room, the raw materials bulk storage room, and the warehouse, and as well as the buried terra cotta pipe lines from the reactor room to their treatment lagoons. And that the second area of investigation as part of operable unit number 3, were the lagoons themselves.

I'm going to try to put it all together for you. This figure – operable unit number 1 deals with groundwater flowing in this direction. So down here, which is basically off this figure, groundwater contaminated this area and is being dealt with by operable unit number 1. Operable unit number 2 basically deals with the contaminated soils in the trench area, and then operable unit three, which is what we are talking about tonight, here is area number 2 which is the actual plant, and here is the lagoons.

Okay. The remedial investigation, again, looked at soils, groundwater, surface water and sediment. As far as the soils, basically we tried to define three things in the remedial investigation for each environmental media. We tried to characterize the contamination, what contaminants are out there and at what concentration. We tried to define where that contamination is coming from and then how far has it migrated from the source. Basically what we found is that we had fourteen different volatile organics in the soils, with 1,2-DCA, or 1,2-Dichloroethane being the main contaminant at the site. As far as the source, the lagoons were unlined prior to 1983. After that time they were excavated and lined with concrete liners, so they were acting as a source prior to 1983 and then the terra cotta piping or pipelines coming from the treatment -- or the active facility leading to the treatment lagoons is the other source on the site.

And then as far as the extent, basically what the data shows is that it has basically stayed close to where the source evolved. There was some migration but all contaminants remain on site. And then try to put it in a figure, these are the concentrations of 1,2-Dichloroethane in and around area number 2, which is right here (indicating on document), and arranges the concentration range, the highest concentration was one million six hundred thousand parts per billion down to non-detect. And again, these lines out here show the range of concentrations and then move further away from the source, the levels of concentration decrease to non-detect.

And then as far as the lagoon area, again, this figure is based on concentrations of 1,2-Dichloroethane. Again, we have a little hot spot right here, per se, and then as we move away from that area, the levels decrease again down to non-detect; and that's soils.

The other -- and then when we look at acetone we tried to put the concentration of acetone on a figure again. We have the same general area of location of contamination near the lagoon right here (indicating on document), as we did with 1,2-Dichloroethane and basically the same for area number 2 and this area, and then in this area where 1,2-Dichloroethane encompassed this whole area.

As far as groundwater, again, we had those three objectives: one, to characterize what was in the groundwater, the types of contaminants and their concentrations. Number 2, to find out the source of where that contamination was coming from and then also to define the extent of contamination. How far has that contamination migrated. In the groundwater we found sixteen different volatile organics. Again, the major compounds were 1,2-Dichloroethane and acetone. As you would assume, the source for soils would be the same source for groundwater and that was the lagoons prior to being lined and the terra cotta pipeline.

As part of the remedial investigation we also tried to define the geology of the soils so we could determine which way groundwater is flowing, how quickly it is flowing and what this thing shows is a cross section of the geology of the site, (indicating on document) here being the northeast tributary, the plant area being approximately right in this area, and below the plant we have what is called saprolite, which is weathered bedrock, basically typical soils for this area. Down underneath the bedrock, underneath the saprolite we have fractured bedrock, and then below the fractured bedrock we have constant bedrock, which basically there's no fractures and there's no groundwater flowing through that area.

To try to put this all in some type of meaning and try to define the concentrations and the extent of contamination. Again, as I mentioned, the primary contaminant is 1,2-Dichloroethane, so most of these figures are based on the concentrations we found at the site of 1,2-Dichloroethane. Okay. As with the soils, again, we have basically two hot spots on the site. One that's near the lagoon area and the second one is within the area number 2, which is the active facility. Groundwater is predominantly moving towards the northeast tributary in this direction (indicating on document). And this figure basically shows the concentration of 1,2-Dichloroethane at the water table.

Okay. This figure, again, is based on concentrations of 1,2-Dichloroethane in the groundwater and the saprolite, which is below the water table, and again, it's basically showing the same thing. We have a high concentration of contaminants in both the lagoon area and the plant area.

Then the third figure is the range of concentration in the bedrock zone, the fractured bedrock zone. Again concentrations are again -the higher concentrations are again right in those areas where the lagoons and the plant are.

The important thing, which I should have mentioned on all these figures, is that we do have delineation or a definition of the extent of the plume, which is defined by these dotted lines and basically the information is showing that the contaminants in the groundwater are not migrating off the property. That's an important consideration.

Then the last environmental media that was investigated for this operable unit was the surface water and sediment in the northeast tributary. We only found two organics, two volatile organics there. Again, 1,2-Dichloroethane and acetone. The source is the groundwater, the contaminated groundwater, is discharging into that stream and it extends just down gradient of the plant area itself. And basically the next two figures define the extent of contamination in that stream with the concentrations being the numbers in parenthesis, with the flow and the stream going this way. Again, there were no detections of these contaminants upstream of the plant, that's what the "ND" stands for, non-detect. Then as you get parallel to the plant, you get detection, concentrations of contaminants. As you move downstream, again, those concentrations fall off until you eventually reach non-detect.

During one sampling event at the site, samples reflected along the entire reach of the stream down to the property boundary and at that particular point no detections were -- no contaminants were detected leaving the site.

That's -- this map basically is for surface water and then this figure is for sediment, which basically follows the same pattern. Upgradient we have non-detect, just parallel to the site we have some detections, and then as you move down gradient, the concentrations decrease until you reach non-detect.

We tried to lump this all together as to contaminants detected, the total list of contaminants detected, is this first table here, table 1-1. It lists all the organics that we've detected and which environmental media they were detected in, soil, groundwater, surface water or sediment. The first numbers basically are the ranges and then the numbers in parenthesis are the frequency of detection. How frequently did they -- were those contaminants detected. And again, let me just point out 1,2-Dichloroethane and acetone were the two primary contaminants at the site.

Okay. Using all this information, we go into a risk assessment. In order for there to be a risk, two pieces of the puzzle have to be present.

One, there has to be a pathway. Although you might have a contaminant here, if you have no pathway from that source to a population or something, there cannot be a risk because there's no exposure. And then the second piece of that puzzle is the chemical has to have some toxicity associated with it. If you have a source of water, water is not toxic, although it is a pathway, it wouldn't cause risks because water in itself does not have any toxicity associated with it.

And not to try to confuse the issue, basically when we talk about risks, we use numbers. We use -- in our -- in the EPA we use the term "unacceptable risk," and that is when the risk is greater than one times ten to the minus fourth or one of ten thousand people may be adversely affected by contaminants. And then if it's a noncarcinogenic chemical we use a hazard -- what's called a hazard index and if the hazard index is greater than one, then that contaminant in itself poses an unacceptable risk.

Not that I'm going to go through this, but basically, the important issue here that I want to point out is one, the site does not pose a current risk to the public health. There are future unacceptable risks associated with the site and these are based on scenarios developed by the Agency. And there are three scenarios that would present an unacceptable risk to human health. First would be if a site was developed as a residential area and those folks would build their own wells and use the groundwater under the site. That would pose an unacceptable risk and these would be the numbers associated with that risk. The other -- another risk would be a child playing in surface water, sediment or spring. Then the third one would be exposure to subsurface soils. If you're building a foundation, gardening or something -- the gardening would be -- you'd have to dig real deep though, the soils, that would pose an unacceptable risk.

But the main point is, that I want to point out is that there is no current risk posed by the site based on our information collected to date by the contaminants present in the soil or the groundwater. The groundwater does not pose a risk because there's no pathways to date, meaning that there are no people using that contaminated groundwater for probable use, for drinking water.

And as far as -- another part of the risk assessment is environmental risks. Basically, what this -- the key here is that it's basically inconclusive to date, because the headwaters of the northeast creek are just above the property. There's not much environment for the bionic organisms to survive in, so they conclusive -- it could not be proven conclusively that the discharge of 1,2-Dichloroethane into the stream along with the groundwater is causing an environmental -- an adverse environmental effect.

The next table lists what the Agency has identified as performance standards or our clean up goals to be obtained by the groundwater remediation. There are several changes here, they are in the handouts, so let me point those out. One, I believe the State has proposed seven hundred and I believe that's up for comment right now and it has not been promulgated. If it's not promulgated by the time that this record decision is signed then the clean up goal will be thirty-five hundred because that is the value that's promulgated today. Another change, I believe, there's a typo, is Tetrachloroethane. The State standard is point seven. I think it says seven in the handout that you have. Because the quantitation limits or analytical methods, that moves up to one, that's the lowest level that we can detect on parts per billion. And I think this 70 here is also a proposed State clean up goal out for public comment and this 70, I think, is missing and that is already promulgated, that's already been established as a State clean up goal. What the law, Superfund Law, requires us to do is to select the most stringent clean up goals. So basically what I tried to do, is I tried to list the federal clean up goals here, the State clean up goals here, and whichever is the smallest number, the most stringent clean up standard is the one that's listed in the shaded area and that will be the one that will be included into the record decision as the clean up goal or performance standard. And then the other difference is the addition of that number, which again is the proposed State clean up. It's a rarity when they go up in concentration rather than going -- rather than decreasing.

And then this is the last half of that table. As you may notice, this table has fewer compounds than that table 1-1, that lists all the contaminants that were detected. Basically the reason is that the other contaminants did not pose a risk. These are the contaminants that were detected on site that posed an unacceptable risk. And as far as -- as far as the surface water, we really don't have any established clean-up goals that are written into laws. We use what is called "TBC's," to be considered. They're not enforceable by any law or any faction, but the goal is to achieve a level of two hundred thousand micrograms per liter in the surface water, and that should be three thousand, I believe, a little typo there, with range concentrations from two to three thousand, so we're just above that goal here.

Basically that's the end result of the remedial investigation, with all that information. Using that information we go on to the feasibility studies. Basically, all the feasibility study is is a screening process going step-wise, looking at the cookbook range of remedial alternatives or techniques that we could use at the site and then through a process of screening that we narrow that list down to a shorter list that we take into a detailed analysis.

So the first step of the process is to eliminate all those techniques that just won't work at the site. Then following that we use the second step which is the screening process and we use three criterias to evaluate those remaining technologies to eliminate those that aren't worthy of passing through the process. And the next couple of slides basically just show the cook -- this is basically the cookbook list of all the technologies that were initially considered and the shaded areas are those that were rejected, and then one more page to that entire table. And then in the right hand column under "Comments" is the rationale for rejecting the technologies. That's the first screening; if the technology just is not implementable at the site, it gets thrown out.

The second step of that screening process is a little bit more detailed. Again, we are looking at the three criteria, institutional implementability, effectiveness and cost. And in this table the ones that are -- the blocks that are encircled in bold are the ones that were kept. Again, the rationale as to why each of these alternatives are either kept or rejected is stated under the criteria.

And then once we get through that screening process we develop our remedial alternatives. The first step is to combine appropriate technologies into remedial alternatives to address the contaminants in each of the environmental media that are of concern. In this instance we are looking at groundwater and surface water. And then, again, we use the same three criteria to look at the remedial alternatives to evaluate them. And those alternatives that survive, those remedial alternatives, that survive that screening then go through a detail evaluation using these nine criteria. To date, only seven criteria have been used. The public comment period incorporates these last two, the State acceptance, as well as the community acceptance, and that's the primary reason why we're here tonight. All of these -the special criteria and the evaluating criteria have already been done and that was done in part by the feasibility study efforts. And then the modifying criteria is basically the result of the public comment period.

And then to just briefly review those remedial alternatives that basically survived the process of elimination. This lists the alternatives that we are required by law to carry through the whole evaluation process, the no action alternatives. That gives us a baseline to evaluate the other alternatives from it. Basically, what a no action alternative is you don't do anything with the site. Then let me point out why there -- the "P" stands for the plant and the "L" stands for the lagoon area.

The second alternative we are looking at long-term monitoring as well as fencing portions of the northeast tributary where we had elevated levels of contaminants in the surface water and sediment.

The third alternative would be long-term monitoring, implementing institutional controls, and then, again, fencing that portion of the northeast tributary where elevated levels of contaminants were detected, that were already outside the fenced area. That's already -- the fence is already in existence.

Alternative number 4, 4-A, -- okay; all the fours are basically the same. It's extracting groundwater through extraction wells, and the only difference between A and B is the type of treatment for the extracted groundwater.

Under A the water will be treated through a air stripper. I have some pictures of that just to help you picture what an air stripper is, and then the contaminated exhaust coming off the air stripper would be treated through a vapor incinerator with the treated groundwater being discharged through the local sewer system.

Then under alternative B, again, we're using air stripping as our primary treatment. Excuse me -- A is -- alternative 4-A deals with air stripping and using carbon absorption which means the off gas coming from the air stripper to remove the contaminants out of that air stream prior to being discharged to the environment, with the groundwater discharging -- with the treated groundwater being discharged to the local sewer system. Then alternative 4-B uses the fume incinerator and the activated carbon to treat the exhaust gas coming from the air stripper.

As far as the surface water, the first alternative is no action, the second one is long-term monitoring. Basically, it's our opinion that by treating the groundwater we will be addressing the contaminants that are migrating into the surface stream along with the contaminated groundwater, so when we stop the migration of the contaminated groundwater at that stream, we will remediate the stream as well.

The next page lists what EPA has identified as our preferred alternatives. Basically it's long-term monitoring along with institutional controls along with groundwater extraction using air stripping as the primary treatment, using fume incinerators to treat the off gas coming off the air stripper and then discharging all the treated groundwater to the local sewer system along with the rest of the discharge at the existing site that goes to the Salisbury treatment plant and then as far as the surface water, just long-term monitoring, continue to sample, to provide the data necessary to assure that the stream is being remediated by the groundwater remediation system.

Then the last page basically lists conversations between us and the State. We were uncomfortable with the evaluation that was done for the soils part of the site, so we have -- we are going to request that the National Starch and their contractors revisit that, which will result in a fourth operable unit, which will mean another public meeting, which will just discuss the soil remediation aspect of the site, and hopefully that will occur within about four months, estimated time frame.

Just for some pictures of what an air stripper is, (displaying photographs) these pictures were taken at another Superfund site called Chemtronics. It is in Swannanoa, North Carolina. Basically, this is a picture of the computer system that runs the whole groundwater extraction system.

Okay. This basically is the extraction well, drilled down to the bedrock. It has pressure sensors in it. It has meters to measure the flow and this is all fed back into the computer system so that the computer can turn the pump on and off as necessary.

Okay. This is the house -- this is the building that was built on site to house the treatment system. The blue stack sticking out is the air stripper.

Okay. The first apparatus that the groundwater discharges into once it gets pumped out of the ground is called an equalization tank and this is a picture of one. Basically, it allows basically the purpose of it is to have the main system see a constant flow of -- of water flowing through it. Okay. This is the base of the air stripper. Air is blown into the bottom and the water is pumped to the top and allowed to trickle down as the air is flowing up forcing the volatile organics out with the water.

Okay Following the air stripper is the water, groundwater, is pumped through these canisters which contain activated carbon. Basically, it polishes the water to ensure that all the contaminants have been removed, and then from this point it's discharged into the Buncombe County sewer system. There's one more. Here we go. And then this is a picture of what a fume incinerator looks like. That's all I have for pictures of these.

Basically that's the end of my presentation. Because we have a court reporter and because this is for the record, if you have any comments or questions, please state your name and you need anything else?

WHEREUPON, the reporter indicated negatively.)

MR. BORNHOLM: Please state your name before you make your comment or ask your question. I'll open it up to you. Do you have any questions or comments?

MS. BARRETT: Jon must have really informed you mighty well, to not have any questions.

MR. YOUNG: I'm Wes Young. What's wrong with the soil that you have to go back to the operation --

MR. BORNHOLM: It's not what's wrong. The alternatives that were looked at and the feasibility studies, in our opinion, did not go far enough and we want them to do a further evaluation of the remedial alternatives that may be available to address the soil contamination at the site. It's our opinion that sufficient data already exists but basically ours will be a really an effort of more evaluation of the technologies available.

MR. YOUNG: Where's the soil now?

MR. BORNHOLM: The soil is -- this shows both areas (indicating on document). This is the figure that delineates the distribution of acetone in the soils. There's a hot spot of contamination in this area which is near the lagoon area and basically in this area at the facility. This area that's shaded here is the plant itself which is on a concrete foundation and then the area between here, over here, and over here is all paved, driveways. Basically, the contaminated soil is down under the facility itself.

And then as far as this area is concerned, the levels of contaminants in the groundwater are higher than the levels in the soil which basically indicates that through natural -- the process of natural percolation of rain, snow through the soil, it's carrying that contaminant to the groundwater and it's our feeling that with the groundwater pump and treat system will catch that contamination as it migrates into the groundwater, at least for this area in here. That's the initial idea. Any other questions or comments?

MR. BEAR: Does any of the contamination left the soil yet? Left the property?

MR. BORNHOLM: To the best of our knowledge, no. Could you state your name please for the record?

MR. BEAR: Odell Bear.

MR. BORNHOLM: To the best of our knowledge, no. Based on all the information from operable units one, two and the work done as far as operable unit three, no contamination has left the site.

MR. BEAR: Something was in the paper about it traveling north; is that true?

MR. WINSTON: Its tending to follow the stream. It's tending to follow the stream in a northerly direction.

MR. BORNHOLM: Which flows in a northerly direction.

MR. WINSTON: It hasn't gotten off the site, off the property.

MR. BORNHOLM: (Indicating on document) This is the figure for groundwater and saprolite area and there is a well down here with a concentration of one -- I think it's one parts per billion, which is right at our detection levels, that we can't detect below that, per se. And then the paired well with that, which is in bedrock has the same concentration. Again, that's right at the quantitation limits of our current technology for detecting contaminants, so one day that could be zero and one day that could be one, depending on the -- how finicky the machines are. So basically, what that's showing us is that the contaminants have not left the site via groundwater, through the groundwater.

MS. BARRETT: Are there any more questions before we conclude our meeting? Okay. Well, we thank you very much for your attention and for coming and the meeting is adjourned.

MR. BORNHOLM: Thank you. (WHEREUPON, the meeting was concluded at 8:00 P. M.)

STATE OF NORTH CAROLINA)
) C E R T I F I C A T E
COUNTY OF MECKLENBURG)

I, Shannon S. McGilberry, Certified Verbatim Reporter and Notary Public, do hereby certify that foregoing public meeting in the referenced matter was taken by me and transcribed under my supervision and that the foregoing thirty-six (36) pages constitute a verbatim transcription of same.

I do further certify that I am not of counsel for or in the employment of any of the parties to this action, nor do I have any interest in the result thereof.

IN WITNESS WHEREOF, I have hereunto subscribed my name, this 16th day of August, 1993.

Shannon S. McGilberry
Certified Verbatim Reporter
Notary Public

My Commission Expires:

August 16, 1993

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